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1823a







*Amesbury*

A  
SHORT TREATISE  
ON  
OPERATIVE SURGERY,  
&c.

ANNEX

### RECOMMENDATIONS.

"I have perused with pleasure a small treatise on Operative Surgery by AVERILL, which appears to me well calculated for Students.

W. GIBSON, M. D.

Professor of Surgery in the University of Pennsylvania."

Oct. 9, 1823.

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GENTLEMEN,

I have examined AVERILL's treatise on Operative Surgery at your request, and am happy to find that it is excellently suited for the use of Students of Medicine. They will doubtless be glad to obtain a work which combines the advantages of a concise and perspicuous style with the additional recommendation of cheapness.

JOHN D. GODMAN.

MESSRS. H. C. CAREY AND I. LEA.

A  
SHORT TREATISE  
ON  
OPERATIVE SURGERY,  
DESCRIBING THE  
PRINCIPAL OPERATIONS AS THEY ARE  
PRACTISED IN  
*England and France,*  
DESIGNED FOR THE USE OF STUDENTS IN OPERATING  
ON THE  
DEAD BODY.

---

BY CHARLES AVERILL, SURGEON, CHELTENHAM,  
Fellow of the Royal College of Surgeons, London.

---

“Elle” (Chirurgie Operative) “sera toujours la partie la plus efficace de l’art de guérir entre les mains des hommes qui la cultiveront avec l’application qu’elle mérite et avec les lumières qu’elle exige.”

MEMOIRES DE L’ACADEMIE ROYALE DE CHIRURGIE.

---

FIRST AMERICAN EDITION,

WITH ADDITIONS

BY JOHN BELL, M. D.

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PHILADELPHIA:

H. C. CAREY AND I. LEA, CHESTNUT STREET; AND WELLS AND LILLI,  
COURT STREET, BOSTON.

1823.

W O  
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1823a

*Eastern District of Pennsylvania, to wit:*

BE IT REMEMBERED, that on the tenth day of November, in the forty-eighth year of the Independence of the United States of America, A. D. 1823, H. C. Carey and I. Lea, of the said district, have deposited in this office the title of a Book, the right whereof they claim as proprietors in the words following, to wit:

“A Short Treatise on Operative Surgery, describing the principal operations as they are practised in England and France, designed for the use of students in operating on the dead body. By Charles Averill, Surgeon, Cheltenham, Fellow of the Royal College of Surgeons, London.”

“Elle” (Chirurgie Operative) “sera toujours la partie la plus efficace de l’art de guérir entre les mains des hommes qui la cultiveront avec l’application qu’elle mérite et avec les lumières qu’elle exige.”

MEMOIRES DE L’ACADEMIE ROYALE DE CHIRURGIE.

“First American edition, with additions by John Bell, M. D.”

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D. CALDWELL,

*Clerk of the Eastern District of Pennsylvania*

---

J. CRISSY AND G. GOODMAN, PRINTERS.



TO  
SIR ASTLEY COOPER, BART.

FELLOW OF THE ROYAL SOCIETY,

AND

SURGEON TO THE KING,

&c. &c. &c.

THE FOLLOWING

SHORT TREATISE ON OPERATIVE SURGERY

IS,

*With his Permission,*

RESPECTFULLY DEDICATED;

BEING

A SMALL BUT SINCERE TESTIMONY OF ADMIRATION

FOR

SURGICAL ATTAINMENTS

OF THE HIGHEST ORDER,

FROM

HIS FORMER PUPIL

AND

STILL OBLIGED FRIEND AND SERVANT.

THE AUTHOR.

Cheltenham,  
May 1st, 1823.



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### ERRATA.

Page 69, For *Abdominus* read *Abdominis*.

229, line 15, for *and through the navel* read *and not through the navel*.

This last error only prevails in some copies of the work.



## INTRODUCTION.

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THE most cursory description of the operations of Surgery, is more than sufficient to demonstrate, that the art of performing them, with a proper regard to the lives and necessities of patients, can neither be learned by a spectator, nor acquired by any prescribed rules, without actual and frequent practice.

The Surgeon is required to know the form, structure, situation, and uses, of every organ in the living body; and he acquires this knowledge principally by dissection of the dead: but to overcome that disgust, and distraction, which invariably attend the study of Human Anatomy, to

familiarize the mind with the different operations, and the best mode of performing them, is indeed, to him, when a student, a difficult and laborious task; yet it has been acknowledged from antiquity, that he must dissect; and it is expedient he should dissect, with all the guidance and assistance, which the experience and instruction of others can supply. The knowledge of anatomy, and the art of operating on the human body, are, however, distinct; and depend upon the principles of different sciences. The latter is especially derived from Mechanics, as well as from Anatomy, and is regulated by the doctrines of Surgery, which at once inform the practitioner what will be the state of his patient after any operation, and suggest to him, the means of rendering that state, as favourable as possible.

The ultimate benefits of any surgical operation, must, of necessity, depend greatly on the dexterity of the operator, and any failure from

a deficiency in this respect, is not less disgraceful to him, than unfortunate for his patient. The importance therefore to the student, of actual practice on the dead body, can not be too highly estimated.

If the Surgeons of France retain, in any respect, the superiority they were formerly acknowledged to possess over those of this country, it is as operators only; which can alone be accounted for, by the attention paid in the French schools, to the practice of operating on the dead. This single branch of the science seems to be less insisted on, than might be wished or expected, by most English students in the dissecting room. It is usually taught in London, as collateral to the courses of anatomical lectures, few of which are devoted to the subject: while the practical knowledge is chiefly obtained from cases furnished by the hospitals. These are the only public opportunities of acquiring a qualification so essential to the professional character, so important to society.

The Author is not aware that any concise work exists, the sole object of which, is to enable the student to practise surgical operations upon the dead subject, preparatory to performing them on the living; and he has, in common with several of his friends, frequently felt the want of some such guide to direct his studies. Descriptions of approved methods of operating on the living body, are, indeed, to be found dispersed through various surgical works, but all of them are too voluminous, and too expensive, to be used in the dissecting room. By the publication of the following Treatise, this desideratum is attempted to be supplied. For its contents, the Author's chief responsibility is that of a faithful narrator; the methods of operating here described, not resting upon his authority, as the best adapted for every possible case, but as the most approved, and such as are now generally pursued. Several of the operations are prefaced by historical remarks, which strik-

ingly exemplify the improved state of Surgery; and the whole is arranged in a manner consistent with the Author's wish of presenting the greatest number practicable upon one dead body: this being always a desirable object, and now rendered too imperative, by the impediments so injuriously opposed to the supply of subjects.

Those operations, which every Surgeon ought to be able to perform dexterously, are here described, in conformity with the rules adopted in the hospitals of England and France; according to the methods taught by Mons. Lisfranc, Surgeon to the first Dispensary, and Professor of Operative Surgery at the Hospital of la Pitié in Paris; as the Author himself has been accustomed to perform them, some on living subjects, and all on the dead body, in the course of his private anatomical studies.

The operations which are requisite for the cure of Strangulated Hernia, for Hydrocele,

for diseases of the eye, for contractions of the *Æsophagus*, *Urethra*, and *Intestinum Rectum*, for *Polypus* in the nose, and some others, are omitted, as they can not, in general, be practised on the dead body: but since the confidence of the Surgeon in performing them, chiefly depends on his anatomical knowledge, the necessary qualification is now justly enforced, and ably explained by the Teachers of Anatomy in London.

A  
SHORT TREATISE  
ON  
OPERATIVE SURGERY.

---

OF INCISIONS.

Though it may appear superfluous to lay down rules for performing the first and most simple of all surgical operations, yet, it is universally allowed, that, if strict attention be not paid by the learner to the principles of any science, little hope can be entertained of his ultimate success. It is not sufficient, however, that the student be able to perform these primary operations, by any fixed rules, unless he acquire also, that ease and facility, which so strikingly distinguish the dexterous from the clumsy operator. Hence, the necessity is manifest, of careful and minute attention to a proper method of holding the bistoury, or scalpel,

while making the various incisions about to be described. Quickness, and flexibility of hand, are, indeed, generally obtained, by long and frequent practice; yet a proper method of holding an instrument, tends, in no small degree, to facilitate these desirable attainments: and, to show that this point is not too trifling to be insisted on, the words of a distinguished Professor are here introduced." "When that which is simple is fully attained, that which is more complex will be easier understood, and better performed; and it will often be found, that the final success of that which is great, very much depends on the accurate execution of that which is little."

---

#### TO MAKE A STRAIGHT INCISION.

With the fingers and thumb of the left hand, put the integuments on the stretch, and in the right, take the scalpel or bistoury, holding it between the thumb and middle finger, at that part where the blade and handle unite, resting the fore-finger on the back of the blade, and applying the ring and little fingers closely round



the handle, the extremity of which will rest against the side of the metacarpal bone of the little finger. In this form, pass the instrument perpendicularly through the integuments, and when it has penetrated to the necessary depth, lower the handle gradually, till the blade be almost horizontal, continuing the cut from left to right. When near the point at which it is intended to terminate the incision, raise the handle, so as to bring the instrument perpendicular, in order that the incision may be of equal depth from one extremity to the other.

In making this incision, care should be taken not to introduce the instrument so deep, as to wound any important part, which may be situated beneath; particular attention should also be paid to the state of the integuments, which, if not kept tense, roll before the instrument, prolonging the operation, and causing unnecessary pain to the patient.

These precautions being attended to, nothing more will, in general, be required to make the first incisions in the operation for hernia, in

cutting upon arteries, for the removal of small subcutaneous tumors, &c., &c.

---

### TO MAKE A CRUCIAL INCISION.

This is formed of two straight incisions, the first of which is made from left to right, as directed; the second consists of two cuts, each of which, (supposing a circle drawn round the first,) is made from the circumference to the centre, or middle of the first incision, and at right angles to it. By making the second incision in two opposite directions, the integuments are kept tense during the operation, and the cut is made with less pain to the patient, than if performed at once.

The second incision may also be made thus. The bistoury is to be held flat in the hand, with its cutting edge turned towards the operator's right; it is then to be pushed under the integuments, from the middle of the farther border of the first incision, till its point arrives at the spot where it is intended to commence the second. The cutting edge, being now turned towards

the surface, is to be protruded through the integuments from the point to the heel, and half of the incision finished, by drawing the bistoury from heel to point. In the same manner the opposite half is to be made, the operator thrusting the bistoury beneath the integuments towards himself. This method is more tedious and painful than the former, which, if cautiously performed, is always preferable.

In dissecting back the flaps, as in the operation of Trephining, the bistoury is to be held like a writing pen, the point of the nearest angle is to be raised between the thumb and forefinger of the left hand, and dissected back with the point of the bistoury; then the cutting edge of the knife is to be turned in a contrary direction, and the opposite angle dissected back; again the direction of the cutting edge is to be changed, and so on alternately, for either of the remaining angle.

---

#### TO MAKE ELLIPTICAL INCISIONS.

These are frequently employed in Surgical

operations, as in the removal of schirrous breasts, tumors of considerable size, and in all cases in which a portion of integument is to be taken away with the diseased part.

The Operator with his left hand draws the integuments towards him away from the line which the incision is to take; whilst an assistant keeps them tense by pulling them in an opposite direction. The inferior half of the ellipsis is to be first formed, the course and extent of which being fixed, the cut is to be made from left to right. The superior is then to be finished in the same manner, taking care that it correspond at every point with its fellow. The part may now be dissected out, and the lips of the wound brought in contact, to ascertain whether they exactly coincide.

The parietes of the abdomen, and the gluteal region are the parts best adapted for practising these incisions, there being generally more fat between the integuments and muscles in those situations, than in any other parts of the body.

## TO PUNCTURE AN ABSCESS.

A collection of matter, when superficially seated, is generally evacuated by a puncture made with a lancet; but when the abscess is a considerable distance from the surface, a straight bladed bistoury is the best instrument for performing the operation, which should be done thus.

The bistoury is to be held nearly perpendicular, with its point downwards, grasping the heel between the thumb and fore-finger of the right hand, the middle finger being placed on the side of the blade, at the same distance from its point, as the matter is supposed to be from the surface. The hand being supported by the ring and little fingers, the bistoury is to be passed through the integuments into the abscess: the situation of the middle finger thus prevents the instrument from puncturing too deep.

---

TO

## DILATE A SINUS ON A GROOVED DIRECTOR.

The handle of the director is to be held be-

tween the index, the middle fingers, and the thumb of the right hand, and its point introduced into the sinuous opening: then the handle is to be taken in the same manner in the left hand, and a Phymosis knife, or a straight narrow bladed bistoury, is to be held in the right with its cutting edge directed upwards; and in this way passed along the groove, lowering the handle of the director as the knife is pushed forwards, till it reaches the extremity of the sinus; then it is to be forced upwards through the integuments, and the operation finished by cutting towards the left hand; withdrawing the director as the incision is terminated.

---

### LIGATURES ON ARTERIES.

The art of applying ligatures on arteries with a proper degree of constriction, so as to ensure the certainty of their action on the tied vessel, is of the utmost importance in the practice of Surgical operations. It is requisite that the following cautions be observed in all cases. That the fingers of the left hand be applied pa-

parallel to the direction of the incision, so as not only to mark its course and extent, but also to keep the integuments tense. The ligatures should be round and compact; those composed of a single waxed thread are generally strong enough for securing any artery. The eyed probe slightly curved, and the aneurismal needle, are the instruments best adapted for passing the ligature beneath the vessel, which should be separated from its lateral connections as little as possible, yet dissected clean at that part where it is about to be secured.\* The ligature should be applied horizontally, and drawn with an even force, so as to divide the internal and middle coats of the artery; taking care that no

\* An instrument has lately been invented by Mr. Weiss, Surgical Instrument Maker, in the Strand, for the purpose of passing the ligature under the artery, when very deeply seated, without raising it from its natural situation. I have once seen it used by Mr. Travers at St. Thomas's Hospital, in tying the Subclavian artery above the clavicle.



accompanying nerve or vein be included within it. As it is an extraneous body, it should be rendered as small as possible; one of its ends should therefore be removed, unless Mr. Lawrence's method be preferred, of cutting off both extremities close to the knot. If the patient faint during the operation, the wound should not be closed till he recover, in order to see if hæmorrhage takes place from any other vessel.

---

## TO

## TIE THE RADIAL ARTERY AT THE WRIST.

Feel for the styloid process of the radius, at which point begin your incision; continue it through the integuments for two inches, in the direction of a line which if continued would pass between the condyles of the os humeri; the artery will be found superficially situated, having the tendon of the supinator radii longus muscle on its outer side.

---

## ULNAR ARTERY AT THE WRIST.

Feel for the Pisiform bone, half an inch



above which, and on the outer side of the flexor carpi ulnaris muscle, make a straight incision of two inches in extent through the integuments; cut through the fascia, an assistant drawing the internal edge of the wound to the inner side; dissect carefully by the side of the tendon, and you find the artery situated on the outer side of the nerve. The colour of these smaller arteries remote from the heart, may occasionally lead the student to mistake them for veins, as the blood frequently remains in them after death, especially in old subjects.

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#### ULNAR ARTERY IN THE MIDDLE OF THE FOREARM.

About three fingers breadth from the internal condyle of the os humeri, on the anterior surface of the ulna, but near its inner edge, begin the incision; continue it in the direction of that bone for three inches; divide the fascia to the same extent, separate the presenting muscles, which are, on the outer side, the palmaris longus lying more superficial, and the flexor

sublimis deeper; and on the inner, the flexor carpi ulnaris. The nerve will be found situated deeply in the inter-space, on the outer side of which the artery is placed.

---

### RADIAL ARTERY NEAR THE ELBOW JOINT.

In the axis of the angle formed by the two condyles of the os humeri, and the extensors and flexors of the hand, an incision is to be made through the integuments, commencing a little below the joint, and continued downwards for three inches. This exposes the fascia of the forearm, which is to be divided to the same extent; when the artery will be laid bare.

In wounds of these small arteries, which have free anastomosing branches, two ligatures are required to suppress the hæmorrhage; one above, the other below the wounded part; these are most readily applied by enlarging the incision, and thus exposing the bleeding vessel. But if the artery be completely divided, its cut extremities retract to a considerable distance, the blood continues to flow into the neighbour-

ing cellular membrane, and it becomes extremely difficult to find the bleeding orifice. In such a case, it is better first to cut down on the vessel at one of the before mentioned points, between the wound and the heart, and apply the first ligature; the lower bleeding extremity will then be more readily discovered.

---

#### BRACHIAL ARTERY NEAR THE ELBOW.

This artery is occasionally punctured in the operation of venesection; producing an aneurism at the bend of the arm, which requires for its cure the obliteration of the vessel. Philagrius is said to be the first who tied this artery for an aneurismal swelling; he secured it above and below the tumor, which he extirpated, and filled the wound with such dressings as tended to promote suppuration. Dominique Anel, a French military surgeon, first tied the artery without opening the sac. The operation may be performed as follows.

Begin the incision half an inch above the inner condyle of the os humeri; continue it up-

wards along the inner edge of the biceps muscle for at least two inches; when, having cut through the integuments, and generally, a little fat, you find the median nerve rising before the artery, which has an accompanying vein on each side. Pass the ligature beneath the vessel from its inner side, by which means the nerve is readily excluded.

---

### BRACHIAL ARTERY IN THE MIDDLE OF THE ARM.

Make an incision through the integuments two inches long on the inner edge of the biceps muscle; this first exposes the median nerve, which has the artery on its inner side between its two accompanying veins; the internal cutaneous nerve is situated on the inner side of the artery, diverging from it, as it descends in the arm.

The operator may be occasionally confused by this artery dividing unusually high in the arm; in the last extremity that I dissected, the separation took place in the axilla; the two trunks

ran down the arm parallel to each other. till they reached the tendon of the biceps, where they diverged into radial and ulnar.

---

### AXILLARY ARTERY.

A wound or aneurismal tumor of the upper part of the brachial artery would require the application of a ligature on the axillary, which may be applied as follows.

The part being shaved, or the hairs cut closely off with a pair of scissars, place the patient on his side, and let the arm be raised up by an assistant; then feel in the axilla for the head of the bone, which is thus lowered by the position of the arm; over it make an incision, in the direction of the limb, three inches long, the middle part of which should be exactly over the head of the bone; this will expose a part of the axillary plexus, behind the largest nerve of which, the median, the artery will be found: the vein passes rather below the artery at this part. After the first incision through the integuments, use the blade of the knife as little as possible,

to avoid wounding any of the branches of the vessel.

---

### SUBCLAVIAN ARTERY BELOW THE CLAVICLE.

This artery has been successfully tied by the late Mr. Keate, Surgeon general to the army, and by Mr. Chamberlaine of Kingston, Jamaica, both in cases of axillary aneurism.

The following on the dead subject, I have found the most ready method of securing this vessel. Put the pectoral muscle on the stretch by raising the arm and extending it backwards; then observe the depression formed by the junction of its clavicular with its sternal portion, the direction of which must be the course of the incision. Begin it half an inch from the sternal extremity of the clavicle, and continue it through the integuments for three inches in the above direction; separate the two portions of muscle from each other exactly in the course of its fibres, then bring the arm to the side, which, by allowing of a wider separation, ex-

poses more readily the parts beneath; at exactly one third of the length of the clavicle from its sternal extremity, you find the vein which is situated directly anterior to the artery, often concealed by fat and cellular membrane. To avoid wounding the vein the greatest care is requisite. For this purpose the dissection had better be carried on with the handle of the scalpel, after having divided the muscle.

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#### SUBCLAVIAN ARTERY ABOVE THE CLAVICLE.

This artery has been tied with success by Dr. Post of New York; a history of the case is published in the ninth volume of the *Medico Chirurgical Transactions*. I believe it has also been once successfully tied in Dublin, and once in Edinburgh. In England the operation has never succeeded. The late Mr. Ramsden, Surgeon to St. Bartholomew's Hospital, was the first who tied it; since which it has been secured at the London Hospital by Sir William Blizard; at Winchester by Mr. Mayo, in March

1822. I saw it tied at Guy's Hospital by Mr. Aston Key for a large aneurismal tumor extending from below the clavicle into the axilla; and in January last, for a similar disease, I saw it secured by Mr. Travers at St. Thomas's Hospital.

Make an incision three inches long just above the upper border of the clavicle, beginning half an inch from its sternal extremity, or immediately on the outer edge of the origin of the sterno mastoid muscle; continue it through the integuments and platysma myoides, taking care not to wound the vein, which is situated before the artery, crossing it nearly at right angles; having separated it from the artery, it should be held on one side by an assistant; then feel for the eminence formed by the junction of the bony, with the cartilaginous portion of the first rib, on the outer side of which you find the artery; the nerves forming the axillary plexus are situated rather behind and to its outer side. Owing to the depth of the vessel considerable difficulty will be found in passing the ligature.



## CAROTID ARTERY.

Till within the present century the operation of tying the carotid artery for the cure of aneurism had never been performed; a case requiring it was considered hopeless as being beyond the reach of remedy by surgical operation.

Harder relates an instance in which it was once attempted at the hospital of la Charité in Paris, according to the old method of opening the sac, and tying the vessel above and below; but so great was the hæmorrhage that the patient died under the hands of the surgeon. Sir Astley Cooper was the first who secured the vessel by ligature for this disease, since which, the operation has been many times performed with success.

Begin the incision at the lower edge of the Thyroid cartilage; continue it upwards and outwards through the integuments and platysma myoides for two inches and a half, immediately on the inner side of the sterno mastoid muscle, so as to form an angle with the Thyroid cartilage: dissect very carefully by the edge of the

muscle, drawing it a little outwards, and the artery is found where it emerges from beneath that muscle and the Omo-hyoideus. Be careful not to wound the internal jugular vein, which is situated on the outer side of the artery, and rather anteriorly; the nervus vagus is behind and to its outer side, and the descendens noni runs down the front of the artery: the whole is surrounded by condensed cellular membrane forming a kind of sheath.

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#### POSTERIOR TIBIAL AT THE ANKLE.

The patient being placed with his face downwards, make an incision two inches long between the inner malleolus and tendo Achillis, but nearer the former; cut through the aponeurosis, and you find the artery nearly under the malleolus, having the tibial nerve rather behind and to its outside, and an accompanying vein on each side.

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#### POSTERIOR TIBIAL RATHER BELOW THE MIDDLE OF THE LEG.

A little below the middle of the leg, begin an

incision on the inner edge of the gastroc nemius; continue it obliquely for three inches in the direction of that muscle, so as to separate it from those beneath; elevate it with the upper part of the tendo Achillis, and on the first division of the muscle beneath, you find the artery with the nerve rather behind and to its outer side, and an accompanying vein on each side.

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#### POSTERIOR TIBIAL HIGH UP IN THE LEG.

Begin the incision below and between the condyles of the femur; continue it through the integuments four inches down the middle of the calf of the leg; cut through the aponeurosis and gastrocnemius externus nearly to the same extent till you come to the internus, on the inner side of the outer head of which you find the artery, with the nerve situated anteriorly and to its outer side, and the vein rather before it.

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#### POPLITEAL ARTERY.

Begin an incision between the condyles of the femur, and continue it upwards for three

inches; the artery will be found deeply imbedded in fat, with the tibial nerve and popliteal vein situated more superficially.

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### PERONEAL ARTERY RATHER BELOW THE MIDDLE OF THE LEG.

Let the incision be three inches long parallel with the fibula, but behind its outer edge; a few muscular fibres will require to be divided; the artery may then be felt by passing the finger across the bone to its posterior and inner border, where it is situated, as it is small and deeply seated, there will be some difficulty in passing the ligature.

Mr. Guthrie, in the seventh volume of the *Medico-Chirurgical Transactions*, has related a case in which he secured this artery higher up the leg, to suppress the hæmorrhage caused by a gun shot wound.

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### ANTERIOR TIBIAL IN THE MIDDLE OF THE LEG.

Begin an incision rather below the middle of the tibia on its outer edge; continue it upwards

and outwards, for three inches, in the direction of the interspace of the tibialis anticus, and extensor longus digitorum muscles; cut through the fascia to the same extent, then separate the muscles, between which on the interosseus ligament, you find the artery, having before it a branch of the peroneal nerve, and an accompanying vein on each side. These arteries, like the smaller of the upper extremity, require when wounded, to be secured by two ligatures.

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### FEMORAL ARTERY IN THE MIDDLE OF THE THIGH.

The operation of tying the femoral artery where it is situated in the middle third of the thigh, for the cure of popliteal aneurism, was first performed by Mr. Hunter, and it is the operation now generally practised.

Put the Sartorius in action by placing the leg in the tailor's position; then make an incision, three inches in length, rather above the middle of the thigh, in the oblique direction of the muscle, and on its inner edge; continue it

through the integuments and fat, till the border of the muscle is exposed. Observe the direction of the fibres to ascertain that you have not come upon the Vastus, then elevate the Sartorius, drawing it a little outwards, which brings the femoral sheath into view; open this with care, by a small incision, and then dilate it by cutting from within outwards; this exposes the artery, which has the vein rather behind and to its outer side.

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#### FEMORAL ARTERY IN THE GROIN.

The patient being placed on his back, separate the thigh to be operated on from the other, and let the leg hang over the edge of the table; this renders the artery more superficial, by putting the integuments and sartorius muscle on the stretch. Begin the incision half an inch below the middle of Poupart's ligament; continue it downwards for three inches, inclining it slightly to the inner side of the thigh, to avoid the saphena vein which is rather superficially seated, and nearly over the artery. Having cut

through the integuments, fat, aponeurosis, and fascia lata, you come to the sheath of the vessels. This being cautiously opened, as in the last operation, exposes the artery, which has the vein on its inner side, but separated from it by a process of the sheath: the anterior crural nerve, not included in the sheath, is a little to its outer side. An interesting case of ligature on this artery, for a wound of the vessel caused by a hay-fork, is related by Mr. Norman of Bath, in the tenth volume of the *Medico-Chirurgical Transactions*.

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#### EXTERNAL ILIAC.

Mr. Abernethy was the first who tied this vessel for inguinal aneurism. He made his incision in the direction of the artery, and secured it by two ligatures. The operation has since been repeatedly performed with success. From the number of cases published, the following appears to be the most general method of securing the vessel.

The hairs being previously shaved from the



part, begin the incision about an inch within, and rather below, the anterior and superior spinous process of the ilium; continue it, in a semilunar form, in the direction of Poupart's ligament. for a little more than three inches, so as to make it terminate just above the external abdominal ring: this exposes the tendon of the external oblique muscle, which being divided to the same extent, and turned aside, lays bare the internal oblique where it arises with the transversalis from the outer half of Poupart's ligament. With your finger, or the handle of the scalpel turn up the borders of these muscles, and the spermatic cord becomes exposed; pass your finger behind it, push the peritoneum upwards, and you feel the artery with the vein on its inner side; they are closely connected by cellular membrane, and must be carefully separated with the handle of the scalpel, or a blunt probe. After having cut through the tendon of the external oblique, be careful to use the knife as little as possible, lest you wound the epigastric artery, which is generally situated near the



inner extremity of your incision, crossing behind the spermatic cord. This accident happened to the celebrated surgeon Mons. Dupuytren, when performing the operation at the Hotel Dieu in Paris, in the Autumn of 1821: the hæmorrhage was so copious, that two ligatures were required on the wounded vessel: the patient afterwards died of peritonitis.

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#### INTERNAL ILIAC.

This artery has been tied by Mr. Stevens of Santa Cruz in the West Indies, and by Mr. Atkinson of York; the former case terminated successfully, and is published in the fifth volume of the Medico-Chirurgical Transactions. I shall give the operation in the words of Mr. Stevens.

“An incision about five inches in length, was made on the left side, in the lower and lateral part of the abdomen, parallel with the epigastric artery; and nearly half an inch on the outer side of it. The skin, the superficial fascia, and the three thin abdominal muscles were succes-

sively divided; the peritoneum was separated from its loose connection with the iliacus internus and psoas magnus, it was then turned almost directly inwards, in a direction from the anterior superior spinous process of the ilium, to the division of the common iliac artery. In the cavity which I had now made I felt for the internal iliac, insinuated the point of my forefinger behind it, and then pressed the artery between my finger and thumb. I then passed a ligature behind the vessel and tied it about half an inch from its origin. I found no difficulty in avoiding the ureter: when I turned the peritoneum inwards the ureter followed it. Had it remained over the artery I could easily have turned it aside with my finger. The woman did not complain of much pain, and I am certain she did not lose one ounce of blood."

This artery is also said to have been successfully tied in Russia, by an army Surgeon, upon whom the Emperor Alexander has since settled a pension, as a reward for the dexterity and skill, displayed in the treatment of the case.

## THE AORTA.

In a case of aneurism of the common iliac artery, which had given way, and when there was no other hope, or chance of saving the patient than by obliterating the aorta, Sir Astley Cooper put a ligature on that vessel, he having been previously satisfied by experiments on the canine species that the circulation could be carried on, by collateral branches, when that artery was closed. The case is published in the first volume of his Surgical Essays, from whence I extract the following account of the operation.

“The patient’s shoulders were slightly elevated by pillows, in order to relax as much as possible, the abdominal muscles; for I expected that a protrusion of the intestines would produce embarrassment in the operation, and was greatly gratified to find that this was prevented by their empty state, in consequence of the involuntary evacuation of the *fæces*; and here let me remark that I should, in a similar operation, consider it absolutely necessary, previously to empty the bowels by active aperient medicines.

I then made an incision three inches long into the linea alba, giving it a slight curve to avoid the umbilicus: one inch and a half was above, and the remainder below the navel, and the inclination of the incision was to the left side of the umbilicus in this form (  $\hookleftarrow$  ). Having divided the linea alba, I made a small aperture into the peritoneum, and introduced my finger into the abdomen; and then, with a probe-pointed bistoury, enlarged the opening into the peritoneum to nearly the same extent as that of the external wound. Neither the omentum nor intestines protruded; and during the progress of the operation. only one small convolution projected beyond the wound.

Having made a sufficient opening to admit my finger into the abdomen, I then passed it between the intestines to the spine, and felt the aorta greatly enlarged, and beating with excessive force. By means of my finger nail, I scratched through the peritoneum on the left side of the aorta, and gently moving my finger from side to side, gradually passed it between

the aorta and spine, and again penetrated the peritoneum on the right side of the aorta.

I had now my finger under the artery, and by its side, I conveyed the blunt aneurismal needle armed with a single ligature behind it; and my apprentice, Mr. Key, drew the ligature from the eye of the needle to the external wound; after which the needle was immediately withdrawn.

The next circumstance, which required considerable care, was the exclusion of the intestine from the ligature, the ends of which were brought together at the wound. and the finger was carried down between them, so as to remove every portion of the intestine from between the threads: the ligature was then tied, and its ends were left hanging from the wound. The omentum was drawn behind the opening as far as the ligature would admit, so as to facilitate adhesion; and the edges of the wound were brought together by means of a quilled suture and adhesive plaster."

## EXTIRPATION OF THE BREAST.

In the history of the principal operations of Surgery, translated from the German into French, Leonidas of Alexandria is stated to have been the first who prescribed this operation as requisite in all cases in which the gland was cancerous. He adopted the following method of operating. Having placed his patient on her back, he made his first incision through the healthy integuments, to which cut he immediately applied the actual cautery to prevent hæmorrhage, and then made a second deeper than the first, which he burnt in a similar manner, and thus continued cutting, and cauterizing alternately, till he had removed the breast; when he finished the operation by again burning the whole surface of the wound, so as to destroy any portion of disease which might have been remaining. On so cruelly painful a process no comment is necessary.

A schirrous enlargement of the gland is the cause which most frequently necessitates the performance of the operation, in executing

which it is requisite to bear in mind, that all the skin directly connected with the tumor, and the cellular membrane surrounding it, to the extent of half an inch, should be taken away: on this the happy result of the operation, in a great degree, depends.

The patient being seated on a chair, the operator places himself before her, when an assistant puts the pectoral muscle on the stretch by raising the arm from the side. The operator then, with the fingers of his left hand placed parallel to the course of his first incision, draws the integuments tense, and makes the cut on the outer and under side of the tumor, of a semilunar form, extending obliquely from above downwards. The corresponding incision is then to be made, beginning and terminating at the same points as the former, but passing on the other side of the tumor, enclosing as much of the integument as may be deemed sufficient, which the operator puts on the stretch by pressing it from him with his left thumb. The dissection, commenced at the upper and outer



part, is to be continued obliquely from above downwards, in the direction of the fibres of the pectoral muscle till the tumor is separated.

If the dissection be attempted from below upwards, it is probable that the lower edge of the pectoral muscle will be raised; and if it be continued from the inner incision, the blood collects before the point of the knife, obscuring the dissection and rendering it more tedious.

Should a gland in the axilla be enlarged. the incision must be extended so as to remove it with its connecting medium. It should first be raised from its seat with a double tenaculum, and then cut away. This, pulling it from its situation, prevents the artery leading to it from retracting so as to escape detection after being divided. Hæmorrhage occurring during the operation, may be restrained by the assistant pressing his finger on the bleeding orifices till it is completed, when the divided arteries must be secured by ligatures, and the borders of the wound approximated by adhesive plaster.



## BRONCHOTOMY.

This operation is said to have been first performed in the time of Cicero, by Asclepiades; and a great number of patients are said to have been then saved by it, who were in danger of perishing from suffocation.

When respiration becomes impeded by disease, as in severe cases of croup; or when some extraneous substance is deposited in the air tube, this operation is found to be most effectual in either restoring the one, or removing the other. It is also occasionally adopted in cases of suspended animation from drowning, to allow of more readily inflating the lungs, when a proper apparatus for that purpose is not at hand. For the first of these cases it may be done as follows.

Place the patient on his back, with his head resting on pillows and inclined backwards as much as the difficulty of breathing will permit. The operator then, sitting on the right side, feels for the space between the thyroid and cricoid cartilages, directly over which, in the inter-

muscular division, he makes a perpendicular incision from half an inch to an inch in length. He then places his left fore-finger on the ligament connecting the thyroid to the cricoid cartilage, along which he directs the straight bladed bistoury into the air tube and cuts a little laterally on each side between the two cartilages. Should this opening not be sufficient for a free admission of air, it may be enlarged by continuing the incision downwards so as to divide the cricoid cartilage, a small portion of which Mr. Lawrence cuts away to prevent the wound closing; that being preferable to the introduction of a tube which often causes excessive irritation.

When there is a foreign body to be extracted, the opening is to be made in the same manner, but continued through the first two or three rings of the trachea, according to the substance to be withdrawn; feeling with the fore-finger to avoid wounding the superior branch of the thyroideal artery, or the thyroid gland. If the substance be not immediately expelled by the

force of the air passing from the lungs through the artificial opening, it should be seized, if practicable, by a small pair of forceps and taken away. The lips of the wound should then be brought together and the patient kept at rest.

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### ÆSOPHAGOTOMY.

When any foreign substance is lodged in the *Æsophagus* that can neither be withdrawn by the fingers nor forceps, nor pushed onwards to the stomach by the *probang*; but continues to prevent deglutition, and by its pressure on the back part of the trachea or larynx threatens suffocation, an operation for its removal becomes requisite, which Mons. Lisfranc recommends to be thus performed.

The patient should be seated in a chair, with his head reclining backwards on the breast of an assistant; the operator placing himself in front, takes the scalpel or bistoury, and, holding it like a pen, commences his incision on the inner border of the left sterno mastoid muscle, opposite the superior edge of the thyroid carti-

lage, and continues it down to the lower edge of the cricoid. An assistant now draws the carotid sheath to the outer edge of the wound to secure it from the knife; while the operator, cutting carefully through the cellular tissue, exposes the æsophagus, where it inclines to the left side from behind the trachea. A canula with a grooved stilet, or the sonde á dard formed like a female catheter, but considerably longer, is to be passed by the mouth down the æsophagus, inclining its point to the left side, which causes it to be readily felt from the external wound. The stilet is now to be pushed forwards through the coats of the æsophagus, when the operator feels with his finger along its concave edge, to ascertain that no large arterial branch be situated on it, and then passes a bistoury into the groove, which directing it onwards opens the æsophagus. He now feels for the foreign substance, which is to be extracted by a pair of dressing forceps passed along his finger.

During the operation, an assistant should

carefully sponge away the blood after each cut of the knife, and should any arterial branch be divided, though little hæmorrhage followed, it should be immediately secured, or it would render the operation much more tedious and obscure. The edges of the wound are to be approximated and a light bandage applied. The patient is to be kept at rest and no nourishment given him by the mouth for a few days, but his strength must be kept up by nutritious clysters.

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## HARE-LIP.

This malformation may be either single or double. When there are two fissures it is thought best to operate on each separately, and not endeavour to unite both at the same time. As it is mostly congenital, it becomes a question at what period after birth the operation may be performed so as not to endanger the welfare of the patient, and at the same time give the most reasonable hope of success. On this there have been various opinions, some having postponed the operation till the child has been five or six

years old, others having operated as early as six weeks after birth: among the latter number is Roonhuysen, a surgeon of Amsterdam who lived in the seventeenth century, and who is said to have had extraordinary success. For many hours previous to the operation he invariably prevented the child from sleep, which generally caused it to remain quiet for some time after. This method of operating soon after birth is now however seldom followed, it having in some cases brought on convulsions, of which the children have died; it is therefore now rarely performed before two years of age, and if it be postponed to a later period the success may be said to be more certain, as the lip becomes better adapted for supporting the sutures, and there is less danger of its speedy ulceration, which would require the operation to be repeated.

In England the operation is generally performed with the knife, and the cut edges approximated by sutures; at the Hotel Dieu in Paris I have always seen the borders of the

fissure removed by the scissars, and needles with the twisted suture used for keeping its edges in apposition. Each mode may have its advantages; the wound made by the knife being cleaner and more regular throughout its whole surface, of course is better adapted for uniting readily by adhesion; while with the scissars the operation is more quickly performed, and less blood lost; which latter circumstance may be of consequence if the subject be very young.

At St. George's Hospital the operation is performed with the knife edged scissars, made by Mr Stodart in the Strand, to which the above objection does not apply.

In operating with the knife, the patient is to be seated on a chair, or, if a child, placed on the knees of an assistant, whose breast forms a support for the head, while his hands placed on the cheeks, keep it steady, and his index fingers pushed forward approximate the edges of the fissure. The operator then, with a straight sharp pointed bistoury, divides any unnatural



adhesions between the lip and gum, and places under the right side of the lip, a thin piece of polished wood, which he supports by the index and middle fingers of the left hand below, and the thumb pressing on the lip above.

Holding the bistoury as a pen, he now thrusts it through the lip, above the angle of the fissure, as high up as the inferior margin of the nostril, or the septum of the nose, and removes the border by cutting obliquely through the lip towards himself. He then places the wood beneath the other side of the fissure, and supports it with two fingers, the assistant pressing the half lip above towards its fellow; the bistoury is to be thrust through at the same point as before and the other border removed, leaving a cut corresponding at every part with the opposed, and forming an angle more or less acute. The suture, formed of a double waxed thread, is now to be passed from without inwards; in doing which the needle is to be held between the thumb and middle finger of the right hand, the index resting on its top, and pushed through



the left side of the lip at the junction of the villous part with the integument, and about half an inch from the cut border; it is then continued from within outwards at a corresponding point on the opposite side. The needle with a part of the thread is then cut away: the operator takes hold of the ends of the suture, and by drawing them downwards, approximates the edges of the wound; an assistant keeping them in that position, the second suture must be passed midway between the first and the apex of the angle, in the same manner as the former. The lower suture is then secured, and afterwards the upper, taking care that the cut surfaces be in exact contact. No plaster or bandage is required till the sutures are removed, which should be about the fifth day, when they are to be snipt with the scissors; a bandage may then be applied and continued for a few days till the union has become more solid.

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#### OPERATION WITH THE SCISSARS.

The patient being fixed as in the former ope-

ration; the operator takes hold of the right side of the lip between the thumb and index finger of his left hand; and opening the scissars he places the lip between the blades and cuts away the border of the fissure at one snip: then taking the inferior part of the left border between the thumb and finger, he removes it in a similar way, observing that the two cuts unite at the apex of the angle.

The needles are now to be applied; common steel ones are said to be as good as any; at one of the largest hospitals in France, the Hotel Dieu at Lyons, these only have been employed for many years. The point being previously greased, it is held between the thumb and middle finger of the right hand, the index resting on its top, and pushed into the lip about a quarter of an inch from the cut border, and just above the junction of the villous part with the integument; it is continued forwards obliquely, so as to pass through about two thirds of the substance of the lip, and make its appearance just above the inner border of the cut surface; it

is then made to enter the opposite side of the wound at a similar point, and is pushed onwards till it has pierced the integuments, its course corresponding to the preceding.

The extremities of this needle are to be encircled by a waxed thread passed behind them, which an assistant draws downwards, so as to bring the cut edges in contact at the upper part, where the second needle is applied in a similar manner. The ends of the thread are now carried round the extremities of the lower needle several times, crossing each time on its middle and forming a figure of 8; they are then to be made cross each other between the two needles, and carried round the ends of the upper one, on which a similar figure is to be formed passing the threads under its extremities and over its middle as before. This being repeated a sufficient number of times to keep the edges of the wound in contact, the ends of the thread are to be made fast, and a small bolster of soft linen placed beneath the needles on each side the wound, to prevent the extremities giving

pain by pointed pressure on the lip. The needles are removed about the fifth or sixth day, the inferior one being first taken away.

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### REMOVAL OF A PART OF THE INFERIOR MAXILLARY BONE.

This operation has been performed with complete success by M. Dupuytren, Surgeon to the Hotel Dieu in Paris: the whole of the chin was the part taken away. I am not certain as to the nature of the disease for which the operation was had recourse to; but it appears that it may be required for exostosis, necrosis, or a cancerous affection of the bone. Each of these diseases would perhaps call for a slight variety in the operation according to the circumstances of the case.

The following is the method in which M. Lisfranc recommends it to be practised on the dead subject.

The body being placed on its back with its head lowered, and chin elevated, an assistant takes hold of one side of the lower lip between

his thumb and fore-finger, while the operator, standing behind the head, in like manner fixes the other. An incision is then made from the middle down to the os hyoides; if it be only the chin that is to be removed this cut will be sufficient, but if a larger portion be to be taken away, another will be necessary, made along the anterior part of the bone so as to form a cross. The skin, which adheres firmly, is to be dissected back on both sides, and the bone denuded, by dividing the periosteum with the knife at the part to be sawed through. M. Dupuytren directs the periosteum on the posterior part of the bone to be cut, by thrusting the knife upwards behind it, and turning its edge towards the bone; but M. Lisfranc objects to this, as it may probably wound vessels which, in the living subject, would furnish considerable and even dangerous hæmorrhage.

The saw is now to be applied, and the bone, being steadily fixed by an assistant, sawed through obliquely that it may come in perfect contact with its opposed portion, which is to be

cut through at the corresponding point. In order to avoid wounding the nose or upper lip while sawing through the bone, those parts should be shielded from the teeth of the instrument by a pad of soft cloth. The division of the bone being effected, its separation from the soft parts is to be completed with the knife. The hæmorrhage produced by such an operation on the living subject, should be suppressed by drawing out the tongue, seizing with a tenaculum such arteries as can be detected, and securing them by ligatures, after which, if blood still continues to flow from invisible sources, the actual cautery is directly to be applied. The extremities of the bone are then to be placed in perfect coaptation, and the edges of the wound brought into contact; pads of lint are to be placed so as to produce compression, and the whole kept together by a roller judiciously applied. Previous to the operation, it will be requisite to extract one or two teeth on each side, at the part where the bone is to be sawn through.

## WRY NECK.

When this deformity is occasioned either by spasmodic contraction of one of the sterno mastoid muscles, or paralysis of the other, it may sometimes be relieved by an operation. In a case of the former kind it would be requisite to divide some of the fibres of the diseased muscle; in the latter a sufficient quantity of the corresponding healthy one would require to be cut, in order to establish an uniformity of action between the two.

The history of the following case may serve as a guide in practising the operation, as well as one proof of its success.

A little girl about ten years of age, whose neck, or rather whose head, had been awry for three years, owing to a permanent spasmodic contraction of the sterno mastoid muscle of the right side, was admitted into the Hotel Dieu, Paris, early in January 1822. On the 16th of that month the operation was performed by M. Dupuytren as follows.

The patient reclined against an assistant, a



puncture was made with a straight narrow bladed bistoury, through the integuments just on the inner border of the sternal extremity of the contracted muscle. The blade of the bistoury, being flatly opposed to the muscle, was pushed cautiously behind it, the point being directed forwards and outwards till it protruded just on the outer side of the clavicular border. The edge of the bistoury was then turned towards the muscle, and a sufficient quantity of its posterior fibres cut to allow of the head being placed erect: the instrument was then withdrawn.

In this way the integuments escaped being divided, and a future scar prevented; a very desirable object, the patient being a female.

The cut edges of the muscle were kept asunder by depressing the clavicle, and inclining the head to the left side. The former was effected by binding the right hand firmly to the foot, the knee being bent; thus the clavicular fibres of the deltoid drew the bone downwards; the lat-



ter by a roller passed round the head and under the left axilla.

The patient was kept in bed; and at the end of thirteen days the punctures were healed, and she had free motion of the neck, though from long continued habit, she still turned her face to the left side. The bandages were reapplied, and the same bodily position maintained till the twenty-first of February, when they were finally taken away, and the patient pronounced cured, the head being but very slightly inclined to the right side, and having free motion in every direction.

In operating on the male, the fibres may be cut on the anterior surface of the muscle, an incision being first made through the integuments. Inclining the head to the opposite side by a roller, and filling the wound with lint, will then be sufficient to keep its cut edges asunder.

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#### PARACENTESIS ABDOMINUS.

When medical treatment is found insufficient for removing the fluid collected within the pe-

ritoneum in cases of abdominal dropsy, the operation of tapping the belly is had recourse to in order to evacuate it. This operation appears to have been performed in the earliest days of Surgery, and never to have been considered either very dangerous or difficult to execute, as it is related that Peter the Great once performed it, and drew away forty measures of fluid. However simple it may be deemed, it is not wholly without danger, as well authenticated cases are related in which the epigastric artery has been wounded and the patient has died of hæmorrhage.

The patient being seated on a high chair, a long cloth or towel should be passed round the upper part of the abdomen, and fixed securely behind by an assistant; this presses the fluid downwards, and at the same time gives support to the diaphragm, preventing its sudden descent, which would otherwise be very apt to produce syncope. The operator, seated in front on a low chair, takes the common straight abdominal trochar, previously smeared with oil, in

his right hand, and holding the handle firm in the palm, he places on the canula his index finger, which not only prevents the trochar entering too far, but also serves as a guide to the instrument. In this manner, about an inch and a half below the umbilicus in the linea alba, it is to be steadily thrust through the integuments and other abdominal parietes, giving it a slight rotatory motion, as it is pushed forwards. Its entrance into the abdomen is rendered evident by the cessation of resistance. By making the puncture at this part, the danger of wounding the epigastric artery is avoided, unless it deviates considerably from its natural course.

The operator then, with the thumb and index finger of the left hand, gradually pushes forward the canula, while, with the same fingers of the right, he withdraws the stilet. The fluid is to be received in a vessel of sufficient size to contain the whole; the towel or cloth which encircles the abdomen being proportionably tightened as it flows away. Should the orifice of the canula be stopped by lymph or omentum, it

must be removed by introducing a blunt probe or director along the tube. The water being evacuated, the canula is to be taken between the index and middle fingers and the thumb of the right hand, and withdrawn slowly, while with the same fingers of the left, pressure is made on the borders of the wound. A pad of lint should be placed on the puncture, a broad flannel roller applied round the abdomen to give the requisite support, and the patient returned to bed.

Some of the French surgeons in puncturing the abdomen, employ a curved trochar similar to that used in England for puncturing the bladder by the rectum. This they plunge through the abdominal parietes at the middle point between the umbilicus, and anterior and superior spinous process of the ilium; the patient lying on the edge of the bed, on the side on which the puncture is made. They choose the right side, as they say the large intestines are more floating at that part on the left, and therefore are in some danger of being wounded.

## PARACENTESIS THORACIS.

The recovery of persons from wounds which had penetrated the chest, first led to the performance of this operation, which, although many instances are related of its success, it would by no means be prudent to attempt in all cases of hydrothorax; that disease being generally accompanied by some organic affection, either of the chest or abdomen. When hydrothorax is the result of an acute disease, as pleurisy, or pneumonia, or follows the suppression of some long continued discharge, and the patient is young or middle aged, and in other respects healthy; it would be wrong not to perform the operation, as the case holds out every probability of terminating well. Baron Larrey in his *Mémoires de Chirurgie Militaire*, relates numerous instances in which he has performed the operation; both for effusions of blood, and matter within the cavity of the chest, in many of which cases his patients recovered. The space between the sixth and seventh true ribs, where the digitations of the external oblique

muscle join those of the serratus magnus, is the part at which it is recommended to make the puncture, provided there be no other rendered prominent by the pressure of the fluid, which, if there be, should always be preferred. A trochar should not be used, as there would be danger of wounding the lungs or diaphragm; a straight bistoury, or a scalpel is the only instrument required, and the operation may be done as follows.

Place the patient in the half-erect position, and make an incision upon the seventh rib, by taking up a fold of integument and cutting in the direction of the bone for two inches. Dissect the integument upwards from the rib and intercostal muscles. The left index finger may then be introduced if necessary to feel the superior border of the rib, and the intercostal muscles divided close upon it, to the extent of half an inch, and a small opening made in the *Plura Costalis*, taking care that the point of the knife does but just enter the chest. The flap is then brought down, the wound closed, and a

director carefully passed through it so as to evacuate the fluid without allowing the admission of air into the cavity of the Pleura. This is afterwards avoided by a compress on the valvular flap, which, if skilfully applied, will serve to prevent the occurrence of Emphysema in those cases in which the lung has been opened by the bursting of an abscess into the Pleura: and by the above mode of operating the intercostal artery, running along the lower margin of the sixth rib, can not be endangered.

If there be much fluid in the thorax a part only should be evacuated, and then the compress placed over the wound till the next day, when it may be removed, and the remainder let out; by this gradual evacuation, the lungs will return by degrees to their original state, and thus the presence of air in the chest will be the more surely prevented. When there is fluid collected in both Pluræ, an operation on each side will be required, which must be performed at distant periods, or the patient may be suffocated by the admission of air into both sides of the chest at the same time.



## PUNCTURING THE PERICARDIUM.

Mons. Boyer, in his *Traité des Maladies Chirurgicales*, observes; when without swerving from the path of prudence it is thought necessary to perform this operation, the method recommended by M. Skielderup, Professor of Anatomy at the University of Christiana in Norway, should be preferred. it being less hazardous than any other. It consists in making a crucial incision through the integuments, removing a portion of the sternum by means of the trephine, and then puncturing the pericardium. The operation is directed to be performed immediately below the part where the cartilaginous portion of the fifth rib unites with the sternum. Here the approximating layers of the two pluræ leave an intervening triangular space, which is part of the anterior mediastinum, situated a little more to the left than to the right, and which is filled by cellular membrane; its apex rising as high as the fifth rib, its base resting on the diaphragm. Thus, after having trephined the sternum at the part above mention-



ed, the pericardium may be opened without wounding the pleura; consequently the chest will not be penetrated. The crown of the trephine used should be of sufficient size to leave an opening in the sternum, the dimensions of which will admit the left index finger; this finger at the same time that it discovers the part at which fluctuation is most discernible, serves as a conductor for the bistoury, with which the pericardium is to be punctured. After having cut through the bone of the sternum, the condensed membrane or ligament lining its inner surface, will offer considerable resistance to the crown of the trephine, which should then be laid aside, and the adhesions divided by the bistoury. Should any hæmorrhage follow, the operation should not be continued until it has ceased. Before making the puncture in the pericardium the body of the patient should be inclined forwards.

M Richerand has supposed it possible to perform a radical cure for dropsy of the pericardium, by making a large opening in the ster-

num, opposite to the heart, and incising a portion of the membrane, between the layers of which he conceives the admission of atmospheric air would be a sufficient stimulant to excite adhesive inflammation.

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### PUNCTURING THE BLADDER.

In cases of retention of urine in which relief can not be obtained by medical treatment, and when the introduction of the catheter is found impracticable, the distention must be removed, or inflammation may speedily ensue; the urine may escape by means of ulceration or gangrene, and being effused into the cellular membrane produce extensive sphacelation if not death: the operation of puncturing the bladder therefore becomes necessary.

There are three methods of performing this operation; by the rectum, above the pubes, and through the perineum. Each of these methods may have its advantages, and each has its particular advocates. The late Mr. Hey, Sir Everard Home, and Mr. Forster, being in favour

of the first. Mr. Abernethy of the second, and Sir Astley Cooper generally preferring the third.

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### OPERATION BY THE RECTUM.

The patient being seated on the edge of the bed, with his legs held up as in the operation for the stone, an assistant, with his left hand, presses on the abdomen just above the pubes, and with his right raises the scrotum. The operator kneeling on his right knee, or sitting on a low chair, passes his left index finger, previously greased, into the rectum; and feeling behind the prostate gland, he discovers that part of the distended bladder which is situated between the vesiculæ seminales. Half bending his finger, he rests its extremity on this point, and passes along its anterior surface the curved trochar, which should be from four to five inches long: this he pushes obliquely forwards into the bladder in a direction, which, if continued, would puncture the parietes of the abdomen midway between the umbilicus and pubes, in the linea

alba. The finger is now withdrawn from the rectum; when, holding the canula between the thumb and first two fingers of the left hand, with the right the operator takes away the stilet, and the urine flowing away, is received in a bason. The canula should be retained in the bladder for a day or two, when it may be removed, and the urine allowed to flow by the rectum, if the natural passage continues obstructed.

The principal objections to this operation are the following. The *Vesiculæ Seminales* may chance to be wounded; the presence of a canula in the rectum often causes tenesmus, or inflammation of that gut; a small portion of faecal matter may pass by the opening into the bladder, and form a nucleus for a future stone; and lastly the passage of the urine by the rectum mostly produces great irritation and excoriation of the surrounding parts.

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#### OPERATION ABOVE THE PUBES.

The same trochar as used in the last opera-

tion is required for puncturing the bladder above the pubes. This is the method generally preferred by French surgeons, who perform it thus.

The patient being placed on the edge of his bed reclines backwards against an assistant, with his thighs slightly bent towards the abdomen. The surgeon standing in front can observe, if the patient be thin, the circumscribed prominence formed by the distended bladder above the pubes; he then places his left index finger on the point where he purposes introducing the trochar, which is one inch and a half above the pubes in the linea alba. The handle of the instrument being held in the palm of the right hand, with the index finger resting on the canula, the trochar is pushed through the integuments, directing its point backwards and downwards in the direction of the axis of the bladder, its entrance into which is made manifest by the cessation of resistance, the easy motion of the instrument, and the dribbling of a little urine. The canula is now held between

the thumb and first two fingers of the left hand, while the stilet is withdrawn with the right, the patient resting on either side, and reclining forwards as the urine flows away. In proportion as the bladder is emptied its coats retract; it is therefore requisite to push forwards the canula to prevent its slipping off its extremity. As soon as the fluid is completely drawn away, the open end of the canula is stopped by a cork; and by means of tape, passed through the rings of its outer extremity, round the pelvis, it is fixed in the bladder. In the course of seven or eight days it is withdrawn, as calculous concretions are apt to form round it, first passing through its tube an elastic gum catheter. The chief objection to this operation is the possibility of the bladder escaping from the instrument, and thus producing extravasation in the surrounding cellular membrane, as well as the necessity of constantly wearing a catheter, or canula in the bladder.

Mr. Abernethy in performing the operation, first separates the muscoli pyramidales from

each other, by making an incision about two inches in length through the integuments and between the muscles. By this opening the distended bladder is readily felt, into which the trochar is introduced as before. The danger of extravasation into the surrounding cellular membrane is thus removed, by the urine passing readily off through the external wound.

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#### OPERATION BY THE PERINEUM.

The patient being placed in the same position as in the operation for the stone, an assistant presses the bladder downwards from above the pubes. The operator, seated on a low chair, takes the scalpel, and, holding it like a pen, commences the incision on the left side of the raphe, between the bulb and crus penis, and continues it obliquely downwards and outwards for an inch and a half. Having reached the bulb, he presses it with his left index finger, to the right side, and feels forwards for the prostate gland and distended bladder. The trochar, which should be straight and not less than three



inches and a half in length, is to be pushed into the bladder, by the side and at the base of the prostate gland. The stilet being withdrawn and the bladder emptied of its contents, the canula may be removed, and a female catheter substituted, which should be there retained by means of tape passed through its rings round the pelvis, from before backwards, and vice versa.

This operation is the most difficult to perform of the three, and requires considerable caution, with an exact knowledge of the relative position of the parts, to enable the operator to steer clear of the surrounding danger, otherwise he may wound the vas deferens, the vesiculæ seminales, the ureter, the prostate, or the rectum; or he may pass the trochar between the rectum and bladder, and be foiled on withdrawing the stilet by finding no urine issue from the tube.

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### LITHOTOMY.

A stone may be removed from the bladder by an incision made into that viscus, either through



the perineum or above the pubes. The former operation, when the prostate gland is cut sideways, is denominated the lateral; the latter, the high operation.

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### LATERAL OPERATION.

The method of opening the bladder by cutting the prostate gland laterally, was first performed towards the close of the seventeenth century by Jacques Baulot, commonly called Frere Jacques, a French monk, who, without any knowledge of anatomy, journeyed about the country performing the operations of Lithotomy and Hernia. He executed the former by first passing a catheter and then, with a double edged knife, cutting by its side through the perineum, straight forwards into the bladder. By this opening he introduced his finger or a director, passed the forceps along its surface, and having pulled out the stone, left the patient exclaiming “ *L’opération est achevée; Dieu vous guérise?* In this way he operated, at the hospital of la Charité and the Hotel Dieu in Paris,

on sixty patients, twenty-five of whom died; and on examining the parts after death it was found in many cases, that he had not only opened the bladder but had also made free incisions into the rectum.

In the hands of Cheselden, a well educated man, a good anatomist, and an experienced surgeon, this operation was considerably improved. He divided the urethra from its membranous portion to the prostate gland, by cutting with the knife on a grooved staff, and opened the bladder with the blunt gorget, pushing it through the substance of the prostate gland. His knowledge of anatomy kept him from committing the blunders of Frere Jacques; consequently his operations were followed by more happy results; indeed his success was most extraordinary, as out of fifty-two patients on whom he operated at St. Thomas's hospital, two only died.

The operation is at present said to be performed with the greatest success in the Norfolk and Norwich hospital. Mr. Martineau, senior

surgeon to that institution, has, in the eleventh volume of the *Medico-Chirurgical Transactions*, given a statement of eighty-four unselected cases, being all those on which he has operated between the years 1804 and 1820; out of which number two only died. Mr. M. in executing the operation, divides the prostate gland with the knife and uses the blunt gorget merely as a conductor for the forceps.

There are three instruments invented for cutting the prostate gland in this operation; each of which has its particular advocates among Surgeons of the present day. First, the knife, the most ancient method, is preferred by many; second the lithatome cachè, invented by Frere Come, a French surgeon, is generally employed in the hospitals at Paris; and third, the cutting gorget, first used by Sir Cæsar Hawkins at St. George's hospital; this last is perhaps the instrument in most frequent use among English surgeons. Of the first and last again, the form is varied; the knife invented by Sir Astley Cooper, and that of Mr. T. Blizard, each of

which has a beak at its extremity, are probably most commonly employed; while the gorgets of Mr. Cline, Sir Astley Cooper, and Mr. Abernethy, have each of them respective defenders among Surgeons who give the preference to that instrument. The operation with the knife may be performed thus.

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#### LATERAL OPERATION WITH THE KNIFE.

The patient being seated on the edge of a table of convenient height, his back supported by pillows, his thighs separated, elevated towards the abdomen, and the soles of his feet grasped in the palms of his hands; a bandage is looped round each wrist, and continued, encircling each ankle, wrist, foot, and hand; so as to bind firmly the hands to the feet; another bandage may be passed from under each ham over the shoulders, and fastened behind the neck. The position will be still better preserved by an assistant standing on each side, giving further support to the limbs, and keeping the thighs separated by slightly pressing the knees outwards.

The operator then taking the grooved staff, smeared with oil, between the thumb and first two fingers of his right hand, passes it into the bladder, and having felt the stone, rests its extremity against it. An assistant, standing on the patient's left side, takes hold, with his right hand, of the handle of the staff, which he keeps steadily fixed, nearly perpendicular, but slightly inclined to the right side. The operator, seated on a low chair, with a double edged scalpel, held like a pen, makes his first incision through the integuments and fat, beginning about an inch below the symphysis pubis, close to the raphe on its left side, and continuing it obliquely downwards and outwards, between the anus and tuberosity of the ischium; dividing the intermediate space into three parts, it finishes exactly at the point where the outer and middle parts join, and from whence a line, if passed across the anus, would separate it into two equal portions. The next incision is between the crus and bulb of the penis, through the accelerator muscle, which lays the bulb

bare; this being pushed aside by the left index finger, the transversales perinæi muscles are divided in the direction of the external wound. With the same finger, beyond the bulb, the operator feels the staff where it is situated in the membranous portion of the urethra, by cutting through which with the point of his knife, he opens into the groove. Keeping the nail of his forefinger in the groove, he takes the knife with which he purposes dividing the prostate, and passing it along his finger, fixes its beak in the groove of the staff; then, rising from his seat, he takes the handle of the staff between the thumb and first two fingers of his left hand, and bearing it towards himself, slides the knife forwards along the groove into the bladder. The prostate is now to be divided by drawing out the knife, at the same time cutting through the gland in a direction downwards and outwards, which being finished, the staff may be withdrawn.

The left forefinger is then to be passed by the wound into the bladder, and the forceps

flatly introduced along its surface, when it may be removed. The stone being felt for, with the blades of the forceps closed, and discovered, should be seized between them, if possible, in the direction of its long diameter, and drawn slowly out; alternately raising and depressing the instrument, or if the stone be irregularly formed, inclining it from side to side, keeping at the same time the first two fingers of the left hand between the handles, thus preventing the stone from being broken by the too forcible approximation of the blades.

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#### LATERAL OPERATION WITH THE LITHOTOME CACHÉ.

This instrument, generally employed by French surgeons, is recommended to be used as follows. The patient is to be placed, and the operation proceeded with as before, till the staff is laid bare, the operator keeping the nail of his left index finger resting in the groove. He then takes the lithotome caché by the handle, its blade being properly set, and passes it



along his finger until its beak enters the groove of the staff, which is proved by making its point pass backwards and forwards along it. Now rising he takes hold of the staff with his left hand, and whilst he depresses it so as to make it perform a semi circle, pushes the Lithotome along the groove into the bladder, and then withdraws the staff. The instrument being in the bladder is to be lifted upwards to avoid the rectum, and pressed towards the patient's right side, to steer clear of the left pudic artery. These cautions being observed, and the concealed blade inclined so that in coming forth it will cut the prostate downwards and outwards, the handles are to be approximated, the blade raised, and the gland being cut as just directed, the instrument is to be withdrawn in the direction of the external wound. The forceps may then be introduced along the finger; though M Lisfranc recommends the introduction of a grooved conductor in the form of a blunt gorget. He directs it to be passed with its convexity upwards, and when in the bladder to be reversed, and



the forceps introduced along its concavity: it is then to be withdrawn in the same manner as it entered, with its concave side downwards, and the stone felt for and extracted as before.

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#### LATERAL OPERATION WITH THE GORGET.

The groove in the staff being opened, and the finger nail resting in it as in the former operations, the operator takes the gorget in his right hand with its cutting edge directed obliquely downwards, and passes it along his finger till he fixes its beak in the groove of the staff; when he moves it backwards and forwards to ascertain whether it is securely fixed. Then rising he takes, as before, the handle of the staff in his left hand, and having brought it towards himself, pushes the gorget horizontally forwards in the direction of the bladder and so cuts through the prostate gland. The urine immediately flowing over the gorget, proves the entrance of the instrument into the bladder, when the staff is to be withdrawn. The forceps may be passed flatly along the surface of the gorget, which

is then to be taken away, and the stone felt for and extracted as before.

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### OPERATION ABOVE THE PUBES, OR THE HIGH OPERATION.

This is the operation which it is supposed was performed by Colot, an Italian, in 1475, on a freebooter of Meudon in France, who was condemned to die for a robbery which he had committed; but it being discovered that he was afflicted with the stone, Louis the eleventh, at the request of some French surgeons, gave Colot permission, by way of experiment, to try the operation upon him, in the hope that it would be serviceable to others who suffered from the disease. It is related that the operation was performed in the church of St. Severin at Paris, with such success, that the patient was cured by the end of fifteen days, when he received a free pardon.

Pierre Franco is the first who wrote any account of the operation. He performed it in 1650 at Lausanne, on a child two years old; he

had begun operating by the perinæum, but finding the stone too large to be extracted in that direction, and seeing that the distended bladder caused a prominence above the pubes, he performed the high operation, and the child got well. In the last century it was frequently performed by Douglas, and Cheselden in England, and by Winslow, and Frere Come in France. Frere Come first made an incision by the perineum into the membranous part of the urethra, through which he passed the sonde à dard, and then opened the bladder above the pubes. In this way Sir Everard Home, about four years since, performed the operation at St. George's Hospital; but he now practises it without making any perineal opening. After this latter method Mr. Ewbank has also performed the operation at St. George's, for the history of which process I am obliged to my friend Mr. Chevalier Jun. who was present at the operation: and I also take this public opportunity of returning him my sincere thanks for the many other professional favours I have received through him.

The following is the method in which the operation was performed.

The groins being shaved, the patient's back supported by pillows, and the thighs slightly elevated, an incision is made through the common integuments in the direction of the *linea alba*, and extending. in the adult, from about two inches above the symphysis pubis, nearly to the angle which the skin forms in mounting upon the penis. This is now continued deeper through the external fascia, and as near as may be divides the bellies of the *pyramidales* muscles from each other. Some few fibres of these muscles, with the fascia beneath them, are now deprived of their insertion into the arch of the pubes by another incision close upon the bone at right angles to the former, and extending into that loose cellular membrane which lies between the abdominal parietes, the bladder, and the peritoneum reflected from the former to the latter. An incision may now be commenced from this last in the direction of the first, and the finger of the operator being introduced between the

peritoneum and the last mentioned fascia immediately covering this, is to be further divided as far upwards as may be necessary. If the bladder be very much distended, it is now laid bare: if not, the laxity of the cellular membrane which allowed this viscus when full to remove the peritoneum to a certain distance from the pubes, will now admit of the same distention by the hand of the surgeon. The sonde à dard (having previously received the proper curve, that is, a larger segment of a smaller circle than is usually given to the catheter) is now passed into the bladder, till its extremity is felt through the coats close to the symphysis pubis, when the stilet is pushed on into the external wound. The bladder, now transfixed by the stilet, and resting on the end of the sonde itself, is to be pushed up towards the navel, the whole sonde à dard being passed further through the urethra. The surgeon now having hold of the point of the protruded stilet, introduces in the groove on the lower or concave side thereof a probe pointed bistoury into the cavity of the bladder,

the coats of which are thus divided downwards as far as the bone, when the finger immediately lays hold of them, and supports them against the lips of the wound, while the sonde á dard is withdrawn, and the other hand or the forceps removes the stone. When it is ascertained that the bladder contains no other calculus, an elastic gum catheter is passed by the urethra and fixed in the bladder. A small piece of dressing is placed on the wound so as to prevent any premature or inconvenient union in any part of it and the operation is concluded. The urine comes away chiefly through the catheter, which is allowed to remain till the state of the wound permits of its being permanently removed.

An Italian surgeon has recommended the extraction of stones from the bladder by cutting into that viscus through the rectum. M. Dupuytren tried the operation at the Hotel Dieu but it did not succeed and therefore was not repeated. It is still, however, said to be practised successfully in Italy.

## THE OPERATION ON THE FEMALE.

In the rare cases in which it is found requisite to perform the operation on the female, it is generally done in the following way.

The patient being securely bound, a straight conductor or staff is passed by the urethra into the bladder, with its groove directed obliquely downwards and outwards towards the patient's left side, the back or convex part being pressed upwards in an opposite direction, in order to enlarge the caliber of the urethra. The operator, holding the staff with his left hand, passes a probe-pointed bistoury along its groove, which cuts through the urethra and neck of the bladder in the first named direction. He then withdraws the instruments and introduces his left index finger to feel for the stone, which having found, he passes the forceps, his finger serving as a director, and extracts as before.

M. Lisfranc recommends the incision through the urethra and neck of the bladder to be made upwards, inclining it slightly to either side to avoid the symphysis pubis. By making the cut



in this way, he says incontinence of urine is not so frequent a consequence of the operation as when the urethra is divided downwards and laterally. Should the opening be not sufficiently large to allow the stone to pass, he directs another incision to be made downwards, and a little inclined to one side, by which means the largest calculus, the pubes will admit, may be extracted.

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### CASTRATION.

This is said to be the most ancient of all operations. It is supposed first to have been performed by the jealous polygamists of the east, who by it secured to themselves a set of individuals to whom they could without fear commit the care of their concubines; indeed it appears still to be practised for the same abominable purpose, as Captain Henry Light, of the Royal Artillery, who has published a history of his travels through Egypt, Nubia, and the Holy Land in 1814, relates that he saw two boats, containing one hundred and fifty black boys, on



their way to Cairo, who had been totally emasculated, and cured in a month, at a village in the neighbourhood. They had been attended by a Franciscan monk; who described the operation as easily performed and without much danger; eleven only having died out of one hundred and sixty. They were intended for the Seraglio at Constantinople.

Celsus is the first who describes the operation as necessary for the removal of disease; he points out three kinds of tumors which, in order to be effectually cured, require the extirpation of the testicle.

When the operation is deemed requisite, but there is still an existing doubt as to the exact nature of the disease, it is recommended immediately previous to performing it, to make a small incision through the forepart of the scrotum into the tunica vaginalis; this caution is given to prevent the consternation and chagrin which surgeons are known to have experienced, who, having prescribed and commenced the operation, have suddenly ceased, when the flow

of water or blood from the tunica vaginalis has proclaimed the disease to be either hydrocele or hæmatocele. The following is the general method of practising the opération.

The hair being shaved from the pubes, place the patient on a table of convenient height, and let his back be supported by pillows. Commence the first incision at the external abdominal ring, and continue it down the front of the testicle to the posterior base of the tumor: if the skin be diseased, two elliptical incisions must be made and the diseased part removed. Having exposed the spermatic cord, and deprived it of its cellular connections, separate the artery and vein from the vas deferens at the upper part of the incision. By means of a curved needle pass a ligature round the two former and give it to an assistant to hold, to prevent them from being drawn within the ring by the action of the cremaster muscle, on the division of the cord. This caution being observed, cut through the whole of the cord about the third of an inch below the ligature; take hold of that

portion attached to the testicle, and draw it forwards, when a few cuts with the scalpel through the loose cellular texture of the scrotum will remove the diseased part. The spermatic artery, the vessel which accompanies the vas deferens, and any others that bleed, are now to be separately secured by ligatures, and the ligature of the cord is to be taken away. The edges of the wound should be approximated by two sutures, and straps of adhesive plaster applied

M. Lisfranc, after the first incision, recommends the tumor to be dissected from below upwards which prevents the blood collecting before the point of the knife in the cellular texture of the scrotum. He secures the cord from slipping within the ring, by directing an assistant to place his index and middle fingers at a little distance from each other behind, and his thumb before it, opposed to the interspace; he thus presses it against each finger, which prevents the possibility of its being retracted; he

then cuts through it and ties such vessels as require ligatures.

Vincent Karn a German surgeon recommends the operation to be thus performed. An assistant with the fore-finger and thumb of one hand takes hold of the cord, with the integuments, above the part where it is to be cut through, whilst with the other he separates the diseased from the healthy testicle. The operator then raises the one diseased, and by a single stroke of the knife cuts it away with its scrotal covering, beginning the incision at the raphe of the scrotum and cutting obliquely upwards and outwards. The arteries being taken up and the edges of the wound approximated, the operation is finished. This method has the advantage of being short; but as in many cases the testicle is too much enlarged to admit of being removed at one cut, and as the cord can not be securely fixed by being pinched up within the integuments, the former must be considered the safest plan of performing the operation.

When the disease extends along the cord, it is cruel to submit the patient to the unnecessary pain of the operation: though M. Lisfranc says in cases of this kind he has seen M. Dubois pull down the cord and then divide it, and M. Dupuytren cut up the inguinal canal to the internal ring, and there cut through the cord; but in all the cases the patients have died.

Again, it is a matter of opinion whether it is not the better plan to secure the whole cord by ligature, and thus do away with the necessity of tying each vessel separately. M. Richerand practises the operation in this way; but cases are related in which a ligature including the whole cord, has produced such excessive pain and irritation as to necessitate its removal: the tying of nerves and veins too, has sometimes produced fatal consequences, therefore, the method of securing each vessel separately appears to be that which may be most safely pursued.

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#### AMPUTATION OF THE PENIS.

Cancerous and malignant fungus affections

are the diseases which give rise to the necessity for this operation; if the extent of the disease can be ascertained, it may be thus performed.

The patient rests on his back, while the operator, sitting by his left side, takes hold of that part of the penis which is to be removed, between the first two fingers and thumb of his left hand, and draws it slightly forwards, then with a straight bladed bistoury, or a catling, at one stroke, he cuts through the penis, about half an inch beyond the diseased part, directing his incision from below upwards. The bleeding arteries being secured by ligatures, an elastic gum catheter is to be introduced by the urethra and retained in the bladder; when doses of dry lint should be applied to the surface of the wound.

The following appears to me the most simple and convenient method of retaining the catheter in the bladder on this, or any other occasion: it is the plan generally adopted in the French hospitals. A metallic ring, the circumference of which should be more than sufficient to en-

circle the penis, is to be covered with cloth, and four long pieces of tape, with the same number of short ones attached to it. This enclosing the penis, is fixed against the pubes by the long pieces of tape, which, surrounding the pelvis in different directions, meet and are tied posteriorly. One of the short pieces is carried through the ring, or round the groove of the catheter on each side, and being tied to its fellow, fixes the instrument securely in the bladder.

When the penis is to be amputated near the pubes, it is best to pass the catheter previous to commencing the operation, as the surrounding parts being more cellular, allow the blood to collect within them, which tends to obscure the orifice of the urethra, and renders the introduction afterwards much more difficult. In this case the incision must be made round the penis, as in amputating a limb; then by slitting up the urethra with a pair of scissars the separated part is removed from the catheter. The arteries being taken up with a tenaculum and tied, dossils of lint are to be applied over the



surface of the wound, and the whole is to be covered by pads of lint or soft cloth. The ring is to be fixed to the pubes over the dressings, and the catheter retained in the bladder as before.

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### AMPUTATION OF THE EXTREMITIES.

Easy as the operation of amputation is acknowledged to be, we seldom see it performed in a masterly style; some parts being cut with which the knife has no business to come in contact, or others, which should be completely divided by that instrument, left partially separated, till the mangling teeth of the saw tear them asunder. As the course of the blood can be stopped by the application of the tourniquet, the operation holds out no immediate danger, and calls for but little knowledge of anatomy; any one may therefore undertake it, and by practising it a few times on the dead subject manage to perform it with considerable dexterity. These remarks apply chiefly to the amputations of the leg, thigh, and arm; not to



the partial amputations of the foot, nor to those between the articulations of bones, as at the different joints, which require a correct idea of the anatomical structure of the part, to enable the operator to perform them with skill.

Active and ingenious assistants are indispensable requisites to the well finishing of any of the operations: however dexterous the operator may be, he appears awkward if his assistants be not expert in the performance of their duty, to effect which judiciously requires more art than is necessary for merely cutting off the limb. Two assistants at least should be present; to the one belongs the business of properly sustaining and fixing that part of the extremity which is about to be removed, so that it shall neither excite action in any of the muscles which are to be divided, by calling on them for support, nor by an unequal bearing, offer an impediment to the progress of the saw, during the operation of cutting through the bone. To the other devolves the duty of retracting the integuments, and shielding the muscles from

the teeth of the saw, as well as presiding over the tourniquet, relaxing or tightening it as the operator may direct.

In all the amputations at joints it has been thought proper to cut off the whole surface of the cartilage exposed; with a view to prevent any impediment to the process of union by a secretion of synovia in the wound.

I shall now proceed to describe separately and successively each amputation, commencing with those, which, though of least consequence to the patient, will not be considered by the operator as unworthy of particular attention.

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#### AMPUTATION OF THE SECOND, OR THIRD PHALANX OF A FINGER.

With us this operation is generally performed by making a circular incision round the finger, about a quarter of an inch nearer its extremity than the joint at which you are about to amputate; then an incision on each side extending back from the first to the joint, so as to form two flaps, which are to be dissected back and

the tendons with the lateral and capsular ligaments cut through, which finishes the operation.

The following is the process adopted by M. Lisfranc, certainly more expeditious than the former; but as it leaves only a single flap, it is not probable that the wound will heal so readily by adhesion as when the operation is performed in the manner already described; yet a case may possibly occur, in which the one operation could be performed, and the other not be practicable.

The hand being prone is fixed by an assistant, who bends the other fingers and separates them from the one to be operated on. The operator with the fore-finger and thumb of his left hand, takes hold of the phalanx to be amputated, placing his thumb on its dorsal and his finger on its palmar surface, and having half bent it, observes the situation of the small fissure in the integuments on the side of the bone, caused by that position; immediately before which the joint will be found. At this point, with a straight bladed bistoury, he makes his

incision, and at one sweep lays open the joint by cutting through the integuments and ligaments on the sides and dorsum of the finger, from left to right. In cutting the ligaments at the sides, the edge of the bistoury is directed obliquely towards himself, and those on the dorsum in the opposite direction. The phalanx is now to be held by its sides, and the ligament at the under part cut through, the bistoury is then placed horizontally with regard to the phalanx, and a flap of sufficient length formed from its palmar surface by cutting between the integuments and bone.

In cases where the finger is so much swollen as to render demiflexion difficult and painful, M. Lisfranc recommends the operation to be reversed, and performed thus.

The hand being supine and fixed by an assistant, the operator extends the diseased finger, and bends the others, that they may be out of the way of the knife. He then takes hold of the phalanx with his left hand, placing his thumb on the palmar, and fore-finger on the dorsal

side, while with his other fingers, he forms a support for the bistoury; which is to be introduced horizontally immediately anterior to the fissure, in a line with the joint, and pushed through beneath the integuments, to the opposite side, the point being directed obliquely upwards to avoid the bone, when a flap is to be formed by cutting forwards and outwards. This being done and held back by the assistant, the heel of the bistoury is applied to the base of the flap; when, by drawing it from left to right, the joint is cut through, which removes the phalanx. In operating in this way at the second phalanx, the point of the bistoury should be passed immediately under the fissure formed in the integuments on the palmar surface. No ligature will be required for the divided vessels; pinching their bleeding extremities with the forceps being sufficient to stop the hæmorrhage.

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AMPUTATION OF A FINGER AT ITS FIRST  
PHALANX OR JUNCTION WITH THE  
METACARPAL BONE.

Put the hand prone, feel for the joint, and

slightly bend the finger: then place the thumb of your left hand on its dorsal aspect, the fore finger on its palmar surface. With the heel of the bistoury begin the incision about the middle of the head of the metacarpal bone, or knuckle; cut almost parallel to the bone of the finger, lowering your hand till the knife is perpendicular, then cut directly from you till you are opposite the joint towards which turn the edge of the bistoury; cut through it, and pass the knife between the integuments and bone on the opposite side, where form a corresponding flap by cutting towards yourself. For obvious reasons never begin with the point of the knife, or raise your hand during the operation.

If the finger be amputated for accident, no ligature will be required; but if for a disease in which there has been long continued inflammation, the arteries should be secured, as they are generally enlarged. The edges of the wound are brought in contact by approximating the other fingers, and binding them together with tape, if the one removed be either the ring, or

middle finger. On either of these fingers this operation should be preferred to the amputation of the second phalanx, as the remaining stump, or first phalanx, in that case is not only useless but a deformity; whereas after this operation the loss of the finger can be scarcely perceived by a superficial observer.

The same operation does for the toes; with this difference, that you begin with the point of the bistoury and cut parallel with the bone, till you arrive opposite the joint which in them is very deep.

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#### AMPUTATION OF THE METACARPAL BONE OF THE THUMB.

When it is the right metacarpal bone to be removed, the hand is to be placed supine and *vice versa*.

The hand being held firm by an assistant, the operator separates the thumb from the index finger, and applies the heel of his bistoury to the middle of the space between them. Then, keeping the point perpendicularly upwards, he



cuts forwards between the metacarpal bones of the thumb and fore finger; till his knife striking against the trapezium he knows it to be opposite the joint, towards which he turns the point of his bistoury, and cutting through the capsular ligament opens the joint. He now glides his knife through the joint, at the same time pressing the head of the bone towards the hand, and forms a flap from the side of the bone by cutting towards himself. The proper extent of the flap may be known by approximating the thumb to the index finger one or more times as required.

It has been recommended to perform the operation in the following way. Feel for the styloid process of the radius, an inch before which you find the joint: thrust your knife into it, and cut inwards till you have cleared it; then cut along the middle space between the thumb and index finger, thrust the head of the bone inwards, and form a flap from the side of the bone as before.

In this manner the joint is not so readily



opened as in the former: the point of the knife is also in danger of being broken when thrust into the joint as last directed.

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### AMPUTATION OF THE METACARPAL BONE OF THE LITTLE FINGER.

An assistant keeping the hand prone, fixes it securely. The operator, with the fingers of his left hand, draws the muscles situated on the side of the bone towards the palm, and with his right index finger feels along the bone till he finds its carpal head. on which he places his left thumb. Now raising his fingers, he allows the muscles to return to their natural situation, and applies his left index finger beneath upon the point opposed to his thumb, and squeezes the muscles outwards. Holding the bistoury perpendicularly as a pen, he thrusts it from above downwards, completely through the integuments, and muscles opposite the joint, and close to the bone, along which he continues his incision till he comes to its other extremity, where he cuts out. The flap thus formed being

held aside by the assistant, the operator dissects back the integuments from the dorsum of the bone, leaving the tendon: having finished which, he cuts into the side of the joint in an oblique direction towards the thumb. He then thrusts the knife from above downwards, between the fourth and fifth metacarpal bones, taking care to avoid puncturing the integuments on the palmar side, and separates the two bones from each other by cutting out towards himself. Now, drawing the bone apart from its fellow, he divides the uncut ligaments, dorsal and lateral; and finishes the operation by turning the edge of his knife upwards, and cutting through the palmar muscles and ligaments.

After both these last operations the bleeding vessels are to be taken up with a tenaculum and secured, and the divided surfaces kept in contact by adhesive plaster.

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#### AMPUTATION AT THE WRIST JOINT.

The tourniquet being applied to the lower part of the upper arm, the forearm is held by an

assistant in a state between pronation and supination; while the operator with his left hand takes hold of the hand to be amputated, and fixes it by placing his thumb on its palmar, and fingers on its dorsal surface; if it be the right hand, and vice versa. Then with the thumb of his right hand, he feels for the styloid process of the radius, an inch before which, at the root of the thumb, he commences his incision. From this point, with a catling or small amputating knife, he makes a circular cut through the integuments round the wrist. The assistant drawing the integuments upwards, the operator dissects them back as far as the styloid process; when, directing the edge of his knife obliquely towards the radius, he opens the joint by cutting through the ligament passing from the styloid process to the scaphoid bone. Bearing the hand slightly downward he continues his incision through the joint, at the same time cutting the tendons on both sides as close to the radius as possible, till the hand is removed; the assistant shielding the reflected integuments from the

edge of the knife by holding them back. The operation when performed in this way leaves an excellent stump.

The following is M. Lisfranc's method.

The tourniquet being applied and the forearm fixed by an assistant with the hand prone; the operator places his two index fingers above the joint, one on the radius, the other on the ulna. He then bends and extends the hand, whilst doing which he draws his fingers down the bones till he feels the styloid process of the radius, on the extremity of which he places the fore finger of his left hand, and his thumb on the corresponding point of the ulna, if it be the right hand to be removed, and the reverse if it be the left. With a catling he makes a semilunar incision through the integuments, with its convexity towards the hand, beginning at the point before the thumb, and ending at the opposite one. Then, directing the point of his knife obliquely downwards, he cuts through the ligaments on the ulnar side, and by depressing the handle continues his incision through the

tendons and ligaments on the dorsum, to the styloid process, at the same time bending the hand so as to expose the articular surface of the bones of the wrist. Having glided his knife through the joint, and divided the capsular ligament, and tendons below, he forms a flap of the integuments, of sufficient length to cover the stump, from the palmar surface, by cutting towards himself, taking care to avoid the pisiform bone.

This latter operation may be reversed and performed thus. Having found the extremities of the radius and ulna as before, place the forearm in a state between pronation and supination, and thrust the point of the catling beneath the integuments from the anterior and inner edge of the ulna, till it appears just before the styloid process of the radius, and form a sufficient flap by cutting towards the palm. Then cut through the integuments and tendons on the dorsal side, and finish the operation by cutting through the joint, from before the styloid process of the radius downwards.

Three arteries generally require to be secured after this operation: the radial, the ulnar, and the interosseal. The cut surfaces are to be approximated by adhesive plaster and the arm kept in a sling.

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### AMPUTATION OF THE LOWER THIRD OF THE FOREARM, WITH TWO FLAPS.

The tourniquet being applied as before, and the upper part of the forearm fixed by an assistant, the hand being in a middle state between pronation and supination, the operator stands on the inner side of the arm. Holding the part to be removed between the thumb and palm of his left hand, he thrusts the catling beneath the integuments from below upwards, pushing it in at the anterior and inner edge of the ulna close to the bone, and thrusting it on till it appears at a corresponding point on the outer edge of the radius, when he forms a flap half an inch or more in length, by cutting towards the wrist. He then passes the instrument under the integuments, behind the bones, from the point

where it came out before the radius, to that on the inner edge of the ulna where it was first introduced, and forms a flap posteriorly of the same length as the former. These being held back by the assistant, the operator introduces the point of his knife between the bones from the anterior side; divides the muscular fibres and interosseous ligament, and draws it out by cutting round the ulna. He again passes it between the bones from the posterior surface, and withdraws it in a similar manner by cutting round the radius. By this figure-of-eight-like incision he cuts through all the muscular fibres, interosseous ligament and periosteum, on, and between, both bones; then, putting the arm in a state of pronation, he saws through the radius and ulna. As the radius at this part is rather larger than the ulna, it should be sawed through first, the latter bone, from its connection with the humerus, being better adapted to bear the weight of the saw.

In using the saw, the operator marks with his left thumb the point at which the bone is to



## 124 AMPUTATION OF PART OF THE FOREARM.

be sawed through; this not only serves as a guide to the instrument, but, with the fingers of the same hand, assists in keeping the bone steady. Then by slight motions of the saw, he forms a small channel in the bone; having done which, he gives a greater degree of mobility to the instrument, drawing it from heel to point, and vice versa, till the bone is sawed through. In doing this he makes no pressure on the saw, he merely puts it in motion; its own gravity being sufficient to enable it to make its way.

Four arteries generally require ligatures, the radial, the ulnar, and the two interosseal. The cut surfaces are kept in contact as before.

In performing this amputation on the left arm, the operator begins by thrusting the knife from above downwards anteriorly, that is from the radius to the ulna; and the reverse posteriorly.

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## AMPUTATION AT THE MIDDLE OF THE FOREARM.

The tourniquet being applied to the lower part of the upper-arm, the forearm is fixed by



two assistants in a middle state between pronation and supination; one supporting the bones at the elbow, the other at the wrist.

The operator, standing on the inner side of the extremity, makes, with a catling, a circular incision through the integuments round the limb, and then dissects them back for one inch and a half, more or less, according to the muscularity of the subject, the assistant who supports the elbow at the same time drawing them upwards. Then holding them back, out of the way of the knife; the operator makes another circular incision round the limb, applying the catling close to the base of the reflected integuments, and cutting through the fascia, and muscles down to the bones. He then passes the catling between the bones and cuts through the remaining muscular fibres, interosseous ligament and periosteum, by the figure-of-eight-like incision as in the last operation. Having ascertained by passing his finger round the bones that they are denuded at the part to be sawed through, and that the soft parts are all

cut, he places the hand prone, and saws through both bones at the same time, the assistant carefully retracting the muscles and integuments so as to leave the course of the saw clear. The same vessels require ligatures as in the last operation.

The flap operation as last described may be performed at this part; and this at the lower third of the forearm: they may also be performed nearer to the elbow joint.

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#### AMPUTATION AT THE ELBOW JOINT.

Though the stump after this operation is not more useful than when the amputation is performed at the lower part of the humerus, and though the healing process is longer protracted, and attended with greater risk to the patient, yet it has been performed by M. Dupuytren in Paris. M. Lisfranc relates that in one case of which he was a witness, the wound was several months before it was completely healed.

The following is the method of operating adopted by M. Dupuytren.

The brachial artery being compressed by the tourniquet, and the extremity fixed by assistants above and below the elbow: the operator thrusts a catling beneath the integuments and muscles of the forearm just below the condyles of the humerus, at the bend of the elbow, and forms a flap three inches in length by cutting towards the hand. This flap being held back, he cuts through the integuments and muscles on the posterior side of the arm, by an incision level with the extremity of the olecranon. Then feeling with his left thumb for the head of the radius, he separates it from the humerus by directing his knife obliquely between the two bones, and removes the ulna by cutting round its sigmoid cavity, taking away as much of the capsular ligament as possible. The bleeding vessels being tied, the condyles of the humerus are covered by the flap, the edges of the wound approximated by adhesive plaster, and a bandage applied.

AMPUTATION AT THE MIDDLE, OR AT THE  
LOWER PART OF THE HUMERUS.

The patient being seated on a low chair, the brachial artery is to be compressed by the tourniquet at the upper part of the arm, the extremity raised from the side, and fixed horizontally by two assistants, one supporting it at the upper part. the other at the elbow.

The operator places himself on the outer side of the limb, kneels on his right knee, keeping his left bent in advance. Resting in this position, he holds the amputating knife above the arm, its point being directed towards the tip of his right shoulder, and, while the assistant keeps the skin tense by drawing it upwards, he cuts through the integuments, gradually raising himself as he continues the incision, till he has formed a circle round the limb. He then dissects back the skin for an inch or more, as may be required, and whilst the assistant keeps it reflected, he stoops as before, and, level with its base, makes a circular cut through all the muscles down to the bone. He again applies the

knife to the deeper seated muscles, and directing its edge obliquely up the limb, he makes another circular incision so as to expose the bone a little higher up, to which part, the periosteum being cut through, and the muscles and integuments held carefully back, the saw is applied, and the bone sawed through. The brachial artery, the deep humeral and others, if requisite, are secured by ligatures; the edges of the wound approximated, and a roller applied.

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#### AMPUTATION AT THE SHOULDER JOINT.

The subclavian artery being pressed by an assistant on the first rib from above the clavicle, so as to interrupt the circulation in the extremity, another assistant supports the arm in an horizontal position.

The operator with a bistoury or scalpel, makes an incision through the integuments along the inner border of the deltoid muscle, extending from its upper part nearly to its insertion; then a corresponding one on its outer border. These two he connects by a third of

a semilunar form, with its convexity downwards, passing across the muscle, just above its insertion, from the lower extremity of the first incision to that of the second, and cutting through the integuments and muscle down to the bone. He then dissects back the muscle, an assistant keeping it reflected, he lowers the arm, and with a catling or small amputating knife, opens the joint at its upper surface by cutting through the capsular ligament and tendon of the biceps. Then cutting round the articulatory surface of the head of the bone, he removes the extremity by dividing the remaining ligament, muscles and integuments; cutting last through that part where the axillary artery is situated as he finishes his incision. The axillary artery is immediately seized and tied, and such of the circumflex and others secured as require ligatures; the glenoid cavity is covered by the flap, and the edges of the wound kept in contact by adhesive plaster.

Baron Larrey, during his military campaigns, remarked that after the operation when

thus performed, the healing process was long protracted, owing to the small number of vessels which the flap received for its nutriment; and that sinuses often formed. He also observed that those cases healed sooner where no flap was saved, than where a single one was only preserved; he therefore, with a slight variation, adopted Desault's plan of making two flaps, and states that out of an hundred and odd cases in which the operation was performed, more than ninety recovered. The following is the method in which the Baron at present performs the operation.

The patient being seated on a low chair, an assistant presses the subclavian artery on the first rib, another assistant fixing the arm at the elbow, and raising it a little from the side. The operator thrusts a long catling through the integuments and deltoid muscle, immediately below the acromion process, till it strikes on the head of the humerus, on the posterior side of which he makes it pass, drawing the arm slightly forwards, and pushing the catling onwards



till it appears in the axilla opposite to the point at which it was introduced. He then forms the posterior flap by cutting downwards and outwards, separating half of the deltoid muscle and the latissimus dorsi from the humerus. He again introduces the catling at the same place, and drawing back the arm, pushes it onwards till it appears at the former point in the axilla, but in this instance passing it on the anterior side of the bone. He then forms the anterior flap, corresponding at every point to the posterior, dividing the artery as the knife cuts out. The flaps being held back, he divides the tendon of the biceps at the superior part of the glenoid cavity, raises the arm, and finishes the operation by cutting through the remaining adhesions. The vessels being tied, the cut surfaces are kept in contact by adhesive plaster.

During the operation the artery may be compressed between the fingers and thumb of an assistant, when the knife has formed the second flap; but where it can be pressed securely on the first rib, less blood is lost, and the fingers



of the assistant are out of the way of the operator.

M. Lisfranc recommends the following method, which, if dexterously executed, is certainly the most expeditious; it however requires considerable practice to accomplish it skilfully.

Supposing the left extremity is to be removed; the patient is placed on an elevated seat, one assistant pressing the artery above the clavicle on the first rib, whilst another draws the arm forwards. The operator standing behind the patient, with a long bladed catling, pierces the integuments on the inner edge of the latissimus dorsi muscle, opposite the middle of the axilla, and pushes it obliquely upwards and forwards, till its point strikes against the under surface of the acromion; then by raising the handle of the knife its point is lowered, and protruded just before the clavicle, at the part where it joins the acromion. He then, by cutting downwards and outwards, forms a flap from the superior and posterior part of the arm, including the whole breadth of the deltoid muscle, and a

part of the latissimus dorsi. This being held back by the assistant, the joint is cut through by passing the knife between its articulatory surfaces from behind forwards, and a corresponding flap is formed by cutting downwards and outwards between the muscles and bone on the inner side of the arm. The vessels being tied, and the flaps placed in contact with each other the operation is finished.

In operating on the right side, the patient should be seated on a low chair, and the catling thrust from above downwards, introducing it just before the point where the clavicle is connected to the acromion, and raising the hand as it is thrust backwards and downwards, till it appears on the inner edge of the latissimus dorsi, when the flap is to be formed, and the operation continued as before.

M. Richerand observes "by this method a dexterous operator can separate the arm from the trunk as quickly as an expert carver detaches the wing of a partridge."

## AMPUTATION OF THE TOES.

Accidental causes, or mortification produced by exposure to cold, may give rise to the necessity of removing the toes. In either of these cases, to remove each toe separately, would be a more tedious and painful process than is requisite. M. Lisfranc has therefore proposed the following method.

Supposing it the left extremity to be operated on, and the foot steadily fixed by an assistant, the operator feels for the head of the first phalanx of the great toe, which joins the metatarsal bone, and on it places his left thumb; on the same extremity of the little toe, he places his left index finger, the toes resting in the palm of his hand. He then, with a narrow bladed catling, or amputating knife, makes a semicircular incision from the point marked by his thumb, to that before his index finger, cutting through the integuments and tendons. By a second cut in the same direction, he opens the joints, and, bending the toes downwards, cuts through the ligaments surrounding the articulations.

Keeping the toes still bent, he passes the knife horizontally a little way beneath the under surface of the bones, so as to get clear of the articulations. Then, raising the toes and pressing them upwards, he lowers the handle of his knife, and, with the point, completes the flap from their under surface, by cutting to the commissure of each separately, beginning at the great toe; the assistant raising them in regular order as the knife cuts through the integuments below. In this way a flap is formed of sufficient size to cover the heads of the metatarsal bones, and unite with the divided integuments above. The arteries which require ligatures being tied, the cut edges are to be kept in contact by adhesive plaster.

In performing the operation on the right foot, the first incision is made from the little toe inwards, and finished in the same manner, the operator cutting from left to right.

In cases in which it is requisite to remove all the fingers, the operation is to be performed in a similar way; keeping in mind that the first

incision, instead of being semicircular, is to be oblique.

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### AMPUTATION OF A PART OF THE METATARSAL BONE OF THE GREAT TOE.

This operation is required when a portion of the bone becomes carious. If the extent of the caries can be ascertained, M. Lisfranc performs the operation in the following manner.

The foot resting on a table, and being fixed by an assistant, the operator, with his thumb on the dorsal surface, and fingers on the plantar, presses the integuments and muscles to the side of the bone, opposite the part where it is to be sawed through. Retaining them in that situation by the fingers and thumb of his left hand, he thrusts a straight bladed bistoury through them, from above downwards close to the bone, and forms a flap by cutting along its side till he has passed the joint which connects it to the toe. From the base of the flap, which is held back by the assistant, he makes another incision obliquely across the bone, and continues it be-

tween the first two bones so as to separate them from each other; he then divides the remaining integuments and muscles on the sole by a circular cut, applies a retractor, and saws through the bone, in an oblique direction, from the base of the flap towards the extremity of the little toe.

The digital branches of the inner plantar artery being secured, if ligatures are required, the flap is kept in contact with the cut surface by adhesive plaster.

A similar operation may be performed on the metatarsal bone which supports the little toe.

The late Mr. Hey, in his *Practical Observations in Surgery*, speaking of caries of the metatarsal bones, says: "When the caries has been confined to the metatarsal bone of the great toe, it has been usual I believe, after making a longitudinal and transverse incision, to saw off that part of the bone which has been found carious. But as it is sometimes difficult to ascertain the extent of the caries, I think it is a more advantageous method of operating, to dissect out the whole of the metatarsal bone at its

junction with the cuneiforme bone. I have done this after a simple incision through the soft parts; but now prefer the removal of a portion of the integuments, in a longitudinal direction. as they are usually in a thickened state, and leave a large cavity which rather prevents the speedy healing of the wound."

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#### PARTIAL AMPUTATION OF THE FOOT AT THE JUNCTION OF THE TARSAL WITH THE METATARSAL BONES.

The late Mr. Hey, in the work last quoted, relating the case of Mary Stanfield, whose metatarsal bones were carious, gives the following as the method he adopted in performing this operation.

"I made a mark across the upper part of the foot to point out as exactly as I could the place, where the metatarsal bones were joined to those of the tarsus. About half an inch from this mark, nearer the toes, I made a transverse incision through the integuments and muscles covering the metatarsal bones. From each ex-



tremity of this wound, I made an incision along the inner and outer side of the foot to the toes. I removed all the toes at their junction with the metatarsal bones, and then separated the integuments and muscles, forming the sole of the foot, from the inferior part of the metatarsal bones; keeping the edge of my scalpel as near to the edge of the bones as I could that I might both expedite the operation, and preserve as much muscular flesh in the flap as possible. I then separated with the scalpel the four smaller metatarsal bones, at their junction with the tarsus; which was easily effected. as the joints lie in a straight line across the foot. The projecting part of the first cuneiforme bone, which supports the great toe, I was obliged to divide with the saw. The arteries which required a ligature being tied, I applied the flap, which had formed the sole of the foot, to the integuments which remained on the upper part; and retained them in contact by sutures. A very speedy union of the parts took place, and the



wound was healed, except a very small superficial sore at the expiration of a fortnight."

M. Lisfranc performs this operation without leaving any of the integument which is situated on the upper part of the metatarsal bones: he adopts the following process.

The tourniquet being applied to the femoral artery, just before the part where that vessel passes through the tendon of the triceps muscle, the heel is supported, and the foot securely fixed by an assistant. The operator passes the index finger of his left hand along the metatarsal bone of the little toe, till he feels its tuberosity joining the os cuboides, on which he places his left thumb. In like manner he carries the fore-finger of his right hand along the metatarsal bone which supports the great toe, till he finds its head, where he places his left index finger, and grasps the sole of the foot firmly in the palm of his hand. He now, with a narrow bladed amputating knife, makes a semilunar incision, with its convex edge towards the toes, through the integuments and tendons,

beginning about half an inch before, and a little below the point marked by his thumb on the outer side of the foot, and continuing across its dorsum to about two lines, or one sixth of an inch, before his index finger. Keeping the foot firmly grasped in the palm of his hand, with the point of his knife he cuts through the ligaments connecting the fifth metatarsal to the cuboid bone, in an oblique direction, which, if continued, would pass through the head of the first metatarsal bone. Having cut the ligaments, which join the two next metatarsal to the cuneiforme bones, less obliquely, he commences on the inner side of the foot by cutting the ligaments, which connect the first metatarsal to the first cuneiforme bone. Then turning the point of his knife obliquely downwards and from him, the handle being above and towards him, and using considerable force, he cuts through the ligament connecting the second metatarsal to the side of the first cuneiforme bone: in doing this, his knife passes between the two bones, its handle describing the arch of a circle from him.

With the point of his knife, he now cuts through the ligament connecting the upper part of the second metatarsal to the second cuneiform bone, bending all the metatarsal bones downwards to lay open the articulations, when he divides the ligaments on the under surface, by cutting obliquely across them. Having separated the metatarsal from the tarsal bones, he glides his knife between the former and the muscles of the sole of the foot, and forms a flap, of sufficient length, by cutting towards the toes. The arteries being tied, the edges of the flap are to be kept in contact with the integuments on the upper part of the foot, by sutures, or adhesive plaster.

In performing the operation on the left extremity, the operator commences on the inner side of the foot, making his first incision from the great toe outwards.

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#### AMPUTATION AT THE ARTICULATION OF THE ASTRAGALUS AND OS CALCIS, WITH THE SCAPHOID AND CUBOID BONES.

M. Chopart was the first who amputated at

this part, it is therefore called Chopart's operation.

The articulation is readily found by tracing with the index finger from the inner malleolus, forwards and downwards, till the projecting part of the scaphoid bone is felt, which marks the situation of the joint on the inner side of the foot. On the outer side, it is found an inch from the tarsal head of the metatarsal bone which supports the little toe. These two opposed points being marked, one by the thumb of the left hand, and the other by the index finger, while the sole of the foot is grasped firmly in the palm, and the leg steadily fixed by an assistant: the operator, with a narrow bladed amputating knife, makes a semilunar incision through the integuments and tendons, extending from the point before his thumb, across the dorsum of the foot, to that before his index finger. Then, bending the foot, he opens the joint by dividing the ligament which connects the Astragalus to the Scaphoid bone. He cuts through the strong ligaments which join the Calcis to

the Cuboid with the point of his knife, holding it perpendicular, cutting transversely, and bending the part to be removed farther downwards. Having cut through the articulation, he forms a flap of sufficient length to cover the stump from the sole of the foot, by cutting towards the toes, between the muscles and metatarsal bones. The bleeding arteries being tied, the edges of the flap are to be kept in contact with the integuments surrounding the dorsum of the foot by straps of adhesive plaster or sutures.

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#### AMPUTATION A LITTLE BELOW THE MIDDLE OF THE LEG, WITH A FLAP.

The femoral artery being compressed by the tourniquet, the limb is raised and supported by two assistants, one fixing the foot, the other the leg, at its upper part. The operator, standing on the inner side of the limb, places the thumb of his left hand on the inner border of the tibia, and his fingers on the fibula; and with a catling makes an incision through the integuments, across the fore part of the leg, extending,

from the outer edge of the fibula, to the inner of the tibia. He then pushes the catling behind and close to the bones, from the inner to the outer extremity of this incision, and forms a flap of sufficient length, by cutting down the leg. This being held back by the assistant, the operator places the edge of his knife on the posterior surface of the fibula, and cuts across it till the point of his instrument reaches the interosseal space, through which he pushes it and cuts through the muscles and ligament situated between the bones. Without raising the knife from the tibia, he draws it round that bone, cutting through the muscular fibres and periosteum, till he comes to its anterior border; where he again passes it between the bones, from above downwards, cuts through such fibres as were not before divided, and withdraws the instrument by cutting to the posterior and outer edge of the fibula. Having ascertained that the bones are properly denuded, by passing his finger round them, he applies the saw; saws through one third of the substance of the tibia, and then

cuts both bones at the same time. The anterior and posterior tibial, and the peroneal arteries being secured, the cut surface of the bones is covered by the flap, and the edges of the wound approximated by straps of adhesive plaster.

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#### AMPUTATION BELOW THE KNEE.

The tourniquet is applied, and the extremity fixed by two assistants, as in the last operation. The operator rests on his right knee, on the inner side of the limb; and with a catling or an amputating knife, makes a circular incision round the leg through the integuments, six inches below the point of the patella, rising from the ground as he finishes the incision. The assistant now draws the integuments upwards, while the operator reflects them back for two inches, or more, according to the muscularity of the subject, by cutting through the cellular tissue which connects them to the fascia below: then kneeling as before, he makes another circular incision, level with the base of the reflect-



ed skin, through the fascia and muscles down to the bones. He passes the catling through the interosseal space, draws it round the tibia, and fibula, as in the last operation; and removes the leg, by sawing through both bones at the same time. Ligatures being applied to the bleeding vessels, the lips of the wound are to be kept in contact by adhesive plaster; the line of union extending from above downwards.

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### REMOVAL OF THE KNEE-JOINT.

Mr. Park of Liverpool performed this operation twice. One of his patients after lingering four months died; the other, who was a robust sailor, after many months confinement, recovered. Should the operation be successful, the limb would be but little better than a wooden leg; while the situation in which the patient would remain during the tedious and protracted cure, would be infinitely more hazardous than that after the operation of amputation above the knee.

It may be practised in the following manner,



on the dead subject, for on the living I should scarcely believe it would ever again be attempted.

An assistant raising the thigh fixes it securely, while the operator half bends the leg; and, with a small amputating knife, makes a semilunar incision through the integuments, extending from the side of the outer condyle of the femur, below the apex of the patella, to an opposite point on the inner condyle, if it be the right leg, and the reverse, if it be the left. He then makes a corresponding cut, beginning and terminating at the same points as the former, but passing above the patella. Now, cutting across the joint below the patella in the course of the first incision, he exposes the articular surfaces of the bones, and divides the crucial ligaments with the point of his knife, taking care not to touch the popliteal artery. These being divided, the assistant raises the thigh nearer the body; while the operator presses the leg backwards against it, and cuts round the posterior part of the femur just above the condyles, so as

to denude the bone at that part; still having a watchful eye to the popliteal artery. The muscular and tendinous structure, on the anterior and lateral parts of the bone, is now to be cut in the direction of the incision, passing above the patella; and the bone, being denuded, is to be sawed through immediately above its condyles. The lower part of the femur and the patella being taken away, the upper part of the tibia is to be carefully laid bare just below its articular surface, by cutting round the bone: its cartilaginous surface is then to be sawed off, beginning at the posterior part of the joint and sawing forwards, the leg being still bent on the thigh, and both securely fixed by assistants. The upper extremity of the tibia may then be brought in contact with the lower end of the femur, and the edges of the wound approximated.

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#### AMPUTATION OF THE LOWER THIRD OF THE THIGH.

The patient should be seated on a table of convenient height, his back supported by pillows,

the tourniquet applied as high up the limb as possible, or the artery pressed against the pubes, where it passes over that bone; and the extremity fixed by two assistants, one supporting the thigh, the other the leg. The operator, placing himself on the outer side of the limb, and kneeling on his right knee, with a full-sized amputating knife, makes a circular incision through the integuments round the thigh, about two inches above the patella in the same manner as directed in the amputation at the lower part of the humerus.

He then dissects back the skin for about three inches, by cutting through the cellular texture which connects it to the fascia and muscles beneath; and while the assistant keeps it reflected, he makes another circular incision close to its base, through the more superficial muscles; the deeper seated he cuts through by a third incision, a little higher up the limb, which lays bare the bone at the part where it is to be sawed through. A linen retractor is now applied, and held by the assistant, to shield the divided

muscles from the teeth of the saw, while the operator saws through the bone. The femoral artery, and others that bleed, being secured, the lips of the wound are to be kept in contact by straps of adhesive plaster, and a roller applied.

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### AMPUTATION AT THE MIDDLE OF THE THIGH, WITH TWO FLAPS.

The extremity should be fixed by two assistants as in the last operation, while a third presses on the artery in the groin so as to interrupt the circulation. The operator, standing on the outer side of the limb, makes the inner flap first by thrusting a long bladed catling from the middle of the anterior, to the posterior surface of the thigh, passing it on the inner side of the femur close to the bone; and forms the flap, from two or three inches in length, by cutting out obliquely.

The femoral artery, divided by this incision, is instantly to be secured. The operator then forms the outer flap, of the same length and shape as the other, by passing the knife in and

out at the same points as before, but carrying it on the outer side of the bone.

The undivided muscular fibres attached to the bone are divided by a circular incision close to the base of the flaps, the edge of the knife being directed obliquely towards the trunk, while the flaps are held back by the assistant. The bone is then to be sawed through, observing that the muscles are protected from the teeth of the instrument either by a retractor, or the fingers of an assistant. Any other vessels which require ligatures being taken up with a tenaculum, and secured, the flaps are to be placed in contact with each other; and so retained by straps of adhesive plaster and a roller.

I have heard it stated by a German surgeon, who had seen the practice, that Dr. Rock, Professor of clinical surgery at the hospital of Munich in Bavaria, after performing this operation, approximates the flaps without securing any vessel; as he finds keeping the cut surfaces in perfect coaptation sufficient to prevent after bleeding.

## AMPUTATION AT THE HIP-JOINT.

Baron Larrey in the history of his military campaigns, mentions eight cases in which he performed this operation; out of the number two recovered; a third lived for a month, at which time the wound was nearly healed, when, owing to the scarcity and badness of provisions, which consisted of unripe fruits, bad potatoes, and sour beer, he, with many other wounded, died of dysentery. The operation has also been performed by British military surgeons during the late wars. On the dead subject, I have seen M. Lisfranc perform it with amazing dexterity, executing it in less than ten seconds. He adopts the following process.

The nates of the patient resting on the edge of the table, and the extremity being supported by an assistant; the operator draws a line, an inch in length, from the anterior and superior spinous process of the ilium, straight down the thigh. From this point he marks another inwards towards the pubes, of half an inch, so as to form a right angle. On the inner extremity

of the last. he places the point of a long bladed catling, and pushes it perpendicularly downwards, till it strikes against the head of the femur: then, passing it on the outer side of the bone, he thrusts it onwards, till it protrudes at about an inch from the margin of the anus. He now cuts outwards, for near an inch, in order to get clear of the great trochanter, and forms the external flap, four or five inches in length, by cutting down the limb between the muscles and bone. The femoral artery, which may now be seen, is to be compressed between the fingers and thumb of an assistant; while the operator thrusts the knife in and out, at the same points as before; but carrying it on the inner side of the head of the bone, he forms a smaller flap on that side of the extremity. He then, with the point of his knife, cuts through the capsular ligament surrounding the head of the femur, dislocates the bone, and removes the limb by dividing the round ligament, and the remaining adhesions. The blood vessels being secured, and the flaps approximated, the operation is concluded.



## FISTULA LACHRYMALIS.

A narrow straight bladed bistoury with a groove near its back will be found the best instrument for opening the duct, and affording a ready passage for the probe or style. The situation of the lachrymal sac may be discovered, and the operation practised in the following manner.

The patient being seated, and his head fixed upright by an assistant; the operator places the fore-finger of his left hand on the outer angle of the orbit, and stretches the integuments by drawing them outwards. Then, with the same finger of his right hand, he traces along the inferior border of the orbit, till he arrives near the inner angle, where he finds the sac situated behind the tendon of the orbicularis muscle, just within the orbitar margin. Marking this spot and holding his bistoury nearly perpendicular, with its edge directed externally, its point downwards, backwards, and a little inwards towards the os unguis, he passes it through the integuments into the duct, and moves its point slightly



backwards and forwards, to certify that the instrument has entered the canal; which is known by resistance being felt on all sides. Then, holding the bistoury with his left hand, he takes a small probe between the fore-finger and thumb of his right, and sliding it down the groove in the bistoury, passes it into the nasal duct, withdrawing the bistoury as the probe enters the canal. A nail headed style may afterwards be worn in the duct; should the surgeon deem it requisite.

M. Dupuytren uses a conical tube, or hollow style, which he passes down the groove of the bistoury into the duct, by means of a small iron instrument in form of a right angle, pointed at one extremity to receive and support the tube, which being passed into the duct, the instrument or support is withdrawn. An engraving of the tube and its support may be seen in the notes to Mr. Travers's excellent work on the Diseases of the Eye.

## EXTIRPATION OF THE EYE.

Cancerous and malignant fungus diseases are those, for the removal of which, this operation is most generally required.

Bartisch, a German oculist, was the first who published any account of the operation. In performing it he used a concave instrument with cutting edges, which he passed beneath the upper eyelid, and then scooped the eye from the orbit.

When it is the eye only which is to be extirpated it may be done as follows. The patient should either lie on his back with his head resting on pillows, or sit on a chair and support his head against the breast of an assistant. The operator stands on the opposite side of the patient, to that on which he is about to operate, and, with the fingers of his left hand placed at the external angle of the orbit, he draws the integuments outwards, while with his right, he passes a straight bladed bistoury horizontally beneath the outer angle formed by the union of the two palpebræ, and by turning its edge

and cutting out, he separates them from each other, and divides the integuments to the outer angle of the orbit. He then takes hold of the globe of the eye with a hook, and draws it a little way out of the orbit, and keeping it in that situation, passes his bistoury beneath the upper eyelid about the middle of the orbit, from whence he cuts inwards, and completes the circle by carrying the instrument at one sweep round the globe of the eye; an assistant raising and depressing alternately the upper and under eyelids. By this circular incision the muscles attached to the globe are cut through; when the optic nerve, and other adhesions, are best divided by a pair of curved scissars. The lachrymal gland, situated on the upper and outer side of the orbit, is now to be hooked down and cut away. The hemorrhage which follows the operation will be suppressed by the application of lint within the orbit. Light dressing should then be applied.

When the palpebræ partake of the disease it is necessary to extirpate them with the eye: to

effect this the hook should be passed from above downwards through both lids, as well as a part of the globe of the eye, which is to be drawn forwards, when the bistoury is introduced above the upper eyelid and the operation concluded as before.

In those cases M. Dupuytren is very particular in recommending that all the cellular tissue within the orbit be removed, in case it should partake of the disease.

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### TREPHING.

A fracture of the skull, with a portion of bone depressed on the brain producing comatose symptoms, is one cause which frequently requires this operation. It is also occasionally necessary for the removal of extravasated blood or purulent matter, or for the extraction of a foreign substance lodged in the brain.

There are certain parts of the skull on which it has been recommended not to apply the trephine; such are the anterior and inferior angle of the parietal bone, where the middle artery of

the dura mater is situated, and which, when running through a canal in the bone, must necessarily be wounded: but as in this case the hemorrhage may be stopped by the application of a little lint, or the vessel may be secured by a pair of fine forceps should it be situated only in a groove, the danger arising from its division ought not to be placed on a par with that of permitting the cause of pressure, or irritation to remain. Over the different sutures and sinuses too, some surgeons have refrained to trephine, in consequence of the injury the dura mater would sustain from its intimate connection with the bone at these parts being torn through, or the danger which would arise from opening the sinus itself; but as many successful cases are related by Pott and others in which the operation has been performed over these parts the above objections appear to be overruled.

In order to practise the operation as conveniently as possible the patient should be placed close to the edge of the bed, his head resting on a thin pillow, which should be supported by

some solid substance, as a thick book, or a piece of board, taking care, if possible, to have that part of the head where the trephine is to be applied the highest.

The head being securely fixed by an assistant, the scalp is to be divided: if there be no depression of bone, a longitudinal incision made in the direction of the fracture will be sufficient, but if the bone be depressed, a crucial one will be required. When there is no fear of wounding the brain in dividing the integuments, the cut through them should be continued down to the bone, so as to raise, if possible, the pericranium with the integuments. If this be not effected the pericranium must be divided in the same direction, and the bone denuded by dissecting back that membrane. The trephine, having its central pin properly arranged, is then taken by the operator, who, holding the handle firm in the palm of his hand, rests his index finger on the crown which he places over the portion of the bone that is to be removed, the instrument being perpendicular to that part of

the scull on which it rests. He now by a half rotatory motion of his hand turns the instrument, which saws into the substance of the bone. As soon as a sufficient channel is formed to confine the crown unassisted by the central pin, it is to be removed; or, as in the trephines of modern make, to be drawn up into the column of the instrument. The crown now used is so made as to clear itself of the dust or sawn particles, consequently there is no necessity for brushing it as formerly; however it will be proper for the assistant either to brush, or blow away the small portions of bone which may lie round the edge of the groove. The trephine being again applied, the bone is to be farther sawed, till the external table of the scull is cut through, which is often to be known by hemorrhage from the diploe. But as there is frequently no diploe, especially in very young or old subjects, it is always proper to examine with a probe to what extent the bone is cut through. The operation is to be continued with more caution, lest the membranes of the



brain be injured by the teeth of the trephine. It will therefore be necessary to examine, from time to time, with a probe to ascertain if the bone be sawn through at any one part. As soon as that is discovered to be the case, the elevator is to be applied, and being used as a lever, with the hand for its fulcrum, the circular piece of bone is, if possible, to be raised. Otherwise the sawing is to be very cautiously prosecuted where the piece of bone appears most firmly connected with the rest of the cranium; and for this purpose, if there be one at hand, the half-trephine is the best instrument that can be used. Should a portion, splintered from the circular piece, remain projecting from the inner table, it should be broken off by a pair of forceps, or cut away with the lenticular knife. The flaps should be placed smoothly over the circular opening, a mild dressing applied with a soft compress of lint, and a double-headed roller.

In performing this operation the French surgeons use the Trepan. On the top or head of the instrument, which is constructed like a car-

penter's whimble, or centre-bit, the operator rests his chin, and turns the instrument from right to left till he has sawed through the bone. They say they give the preference to this instrument because it does not require so much manual force or pressure, as the trephine; in consequence of which there is less danger of wounding the membranes of the brain.

## CONCLUSION.

The author trusts he has now fulfilled the engagement made in the outset of his work, and that the operations, though not detailed in the most elegant language, are so described as to be perfectly intelligible to every professional reader. It may not be out of place to observe, that, with regard to the ultimate result of Surgical operations in England and France, as far as the author has had an opportunity of noting, a greater proportion of patients recover after all operations in the London, than in the Paris Hospitals: this may, in part, be accounted for by the fact of patients being submitted to operations in Paris, on whom, in London, it would be considered useless to operate; at the same time it must not be forgotten, that some of the leading French surgeons are very jealous in adopting any surgical improvement which may have had its origin on this side of the water; witness the reluctance on their part to the healing of wounds by adhesion. After the operation for hernia, the lips of the incision are not

brought in contact but remain asunder, and the wound, filled with *charpie*, is left to granulate: in consequence of this, peritoneal inflammation generally succeeds, to which the patient frequently falls a victim. Out of seven cases of this kind, which the author witnessed at the Hotel Dieu during the winter of 1821, one only recovered. Nevertheless, in quickness and dexterity of operating, the Surgeons of France may rank before us; this, however, as is before stated, must be attributed to the facility with which they procure subjects, and the attention they bestow upon the practice of operating on the dead.



## ADDITIONS

BY THE

## AMERICAN EDITOR.

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### CATARACT.

The operations for the cure of obstructed vision from this cause are performed by depressing the opaque lens into the lower and posterior part of the eye; or by extracting it entirely through an incision made in the cornea, or finally by breaking down the lens and trusting to its gradual absorption and disappearance.

Until within some years past, the discussion ran on the comparative merits of couching or depression, and extraction, for the removal of cataract, but now, the most popular method in Britain and the United States is to introduce a needle into the eye and break down the lens, as recommended and practised by Saunders and Adams.

## COUCHING.

The operation by couching or depression is preferred in most cases by M Dupuytren.

The needle should be slightly convex, sharp at both edges, smooth on its convex dorsum; with one or more dots black or white according to the colour of the handle, on that side of it corresponding to the convexity of the instrument. The patient being seated in a chair with a high back to it, or, as M. Dupuytren prefers, slightly raised in his bed, his head is supported by an assistant, who at the same time fixes the eye with his fingers, or a speculum, or elevator, (the first method is preferable). A piece of linen or a napkin is thrown over the other eye. The assistant, if no instrument is used for the purpose, puts the points of his fore and middle finger on the upper eyelid and raises it, at the same time that he gives a slight pressure to the eyeball, but rests his fingers on the margin of the orbit, so that what pressure they give to the eye may be steady.

The surgeon sitting down before the patient,



places his foot upon a stool of such a height, that when the elbow rests on the knee, the hand may be opposite to the eye. Now with the fingers of one hand, he presses down the lower eyelid, and when he wishes to fix the eye, as he is about to introduce his needle, he pushes upon the eyeball with the point of his fingers. It is to be particularly observed, that any change of the degree of pressure on the eyeball, during the operation, is to be made by the motion of the operator's fingers, the assistant has only to keep steady. So far the preliminary and by no means unimportant directions of Mr. Charles Bell. The operation itself is we think more clearly described by Lisfranc than by any other surgeon—It is as follows.

Having dipt the needle in oil, and taking it as you would a writing pen, the little finger resting on the cheek, introduce the instrument through the sclerotica, at a small distance, a line and a half to two lines from the border of the cornea, in the line of the transverse diameter of the pupil, the edges of the needle being outwards

and inwards until the sclerotica is perforated. When the point is in, let the handle rotate gently on the fingers till the dots on the handle are turned towards you, that is, till the convexity or back of the needle is outward: pass it along in this direction horizontally two thirds of the distance across the cornea, when it is distinctly seen through the pupil; rotate the instrument on the lens, so as to break adhesions and rupture the capsule of the lens: pass on then the needle in its original position, with the dots outwards, until the point has reached the opposite, or inner angle of the eye: depress the handle, turn the dots upwards, then raise the handle gradually giving it a semirotation, so that when it has got on a line with the upper part of the eye, the dots, at first upwards, may be turned outwards. By this movement the concavity of the needle as the handle is raised, presses the cataract downwards, and its semirotation makes the convexity turn slightly outwards, so that the lens, while depressed, is also carried rather backwards, as well as downwards, thereby making allowance

for the figure of the globe of the eye, and the curved course which the lens has to pursue in its descent into the vitreous humour. These objects attained, the needle is carefully withdrawn from the eye in a direction opposite to that in which it had been introduced.

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## EXTRACTION.

The patient is to be seated in a low chair before a moderate light which strikes the eye obliquely, and a cloth put over the other eye: an assistant standing behind, brings his breast so as to support the back of the head, puts his left hand under the chin and with his right taking the elevator of Pelier, or with his fingers he raises the upper eyelid by pressing in the integuments of the eyelid betwixt the eyeball and margin of the orbit. The operator, with the tips of his fingers, presses the lower eyelid against the eyeball, or, as Wathen directs, he is to place the fore and middle finger of his left hand upon the tunica conjunctiva just below and a little on the inside of the cornea. The

other hand holds the knife, the elbow rests on the knee, and the little finger on the outer side of the eye, or on the cheek bone. The point of the knife is to enter the cornea on the side next the lesser angle of the eye, about one tenth of an inch above its transverse diameter and a little anterior to its connexion with the sclerotica: the knife, thus introduced, is to be pushed on slowly but steadily in a straight direction, with its blade parallel to the iris; so as to pierce the cornea towards the inner angle of the eye, on the side opposite to that which it first entered, till one third part of it is seen to emerge beyond the inner margin of the cornea, and the point of the knife approaches the commissure of the eyelids in the greater angle of the eye. When the knife has reached so far, the puncturation or that part of the operation which is preparatory to the section of the cornea is completed. The broadest part of the blade is now between the cornea and iris; and its cutting edge below the pupil, which, of consequence, is out of all danger of being wounded by it.

At this time, as every degree of pressure must be taken off the globe of the eye, the fingers both of the operator and his assistant, are to be instantly removed from that part, and shifted to the eyelids; these are to be kept asunder, by pressing them gently against the edges of the orbit, and the eye itself is to be left entirely to the guidance of the knife; by which it may be raised, depressed or drawn on either side as shall be found necessary. The aqueous humour being now partly, if not entirely evacuated, and the cornea of course rendered flaccid, the edge of the blade is to be pressed slowly downward, till it has cut its way out and separated a little more than half of the cornea from the sclerotica, following the semicircular direction marked out by the attachment of the one to the other.

The incision being finished, the eyelids are to be shut; as it is desirable that the eye should then have rest for a few minutes. When the iris is unusually convex, and in making the section of the cornea becomes entangled before the knife, the cornea is to be pressed on gently

with the finger, which disengages it: or when the eye-ball moves before the knife, we must suspend, as it were, the progress of the knife, but not in the slightest degree withdraw it; we wait a little for the ceasing of the spasm, and then with the knife bring back the eye to its original position. Sometimes, from these causes, the opening is insufficient; then scissars are used to enlarge it. The cornea being divided, it will be found that the eye, which, before and during the incision, could not without difficulty be kept from motion, becomes now quiet and passive.

The next part of the operation consists in puncturing the capsule of the lens, which is effected by introducing a needle made for the purpose, through the wound in the cornea, into the pupil, or in its place, the *kistitome*. The anterior portion of the capsule is to be then opened by either of these instruments; and a gentle degree of pressure being made on the eye the pupil is observed gradually to enlarge, and one edge of the lens is observed escaping through

it; all pressure is to be immediately removed, and the cataract escapes.

Sometimes it is necessary to assist its escape through the aperture in the cornea, by the use of the needle or scoop, by which last, or the concave end of the curette, are removed any gross particles of the cataract or of the pigmentum nigrum which remain in either of the chambers of the aqueous humour, or between the lips of the wound in the cornea, or between the globe and lower eyelid.

This being accomplished, the flap of the cornea is to be smoothed, and the edges of the wound exactly adjusted to each other, by the convex extremity of the curette, and by gently rubbing the end of the finger over the upper eyelid when shut. The window shutters should now be closed in part, or the curtains drawn; but if both these be wanting, the patient may be turned from the light, and having continued in that situation with his eyes shut for some little time, may then be permitted to open them again. This will be a good test of the success of the



operation; for if it has answered its end, the patient will, with transport, immediately proclaim the return of his sight.

If, however, we do not experience this happy result, and find on examination that the capsule of the lens is opake, it may now be extracted by means of a small pair of forceps: but in attempts of this nature, the utmost caution is required, that the vitreous humour does not escape. The eye should not be kept open long at a time, and the attempts to extract the portion of opake capsule should be repeated as often as necessary, but not continued more than a minute at a time, and the eye, in the intervals, should be covered with a small compress of fine linen, wet with clear cold water.

When the capsule, though lucid at the time of the operation, becomes subsequently opake, forming what is called secondary cataract, we are directed to repeat the section of the cornea and remove the opake membrane.

After both couching and extraction, the patient should be kept in a recumbent posture in

a room somewhat darkened, with no dressing to the eye, but a simple compress loosely applied.

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## EXTRACTION

### BY SIR WILLIAM ADAMS'S METHOD.

Sir William Adams thinks that many of the difficulties and unpleasant consequences attending the usual operation for extraction, may be prevented by the method which he proposes, and which consists in the introduction of the needle, as for couching, and forcing the lens through the pupil into the anterior chamber of the eye, from which it is extracted through an opening made in the cornea. The operation is thus described.

The eye is first prepared by the application of a weak solution of belladonna over night, so that the pupil may resume its natural size as soon as the opaque lens has been placed in the anterior chamber; which would not be the case were the solution made strong and applied but a short time before the operation. The first

part of the operation should be conducted precisely as if the cataract were of the soft kind, by introducing the two-edged needle through the sclerotica, a line behind the iris, with its flat surface parallel to that membrane. Its point is then to be directed through the posterior chamber, on a line with the transverse diameter of the opake lens, when its edge should be turned backwards, and a complete division of the capsule and lens be attempted. If, upon trial, the lens be found too hard to admit of an immediate division, the point of the needle should be withdrawn a little, and then carried something below the line of the transverse diameter of the cataract, when, upon making pressure with its flat surface against the latter body, it becomes dislocated, and the upper part tilts forwards, through the pupil, into the anterior chamber, after which, without any difficulty, it may be entirely carried through the pupil, and with its posterior part turned forwards. When this is effected, the operator, with the point of the needle, (taking care however, not to wound the

iris) should lacerate, or cut in pieces, the remaining part of the capsule, throughout the whole extent of the circumference of the dilated pupil, by which means secondary cataract is certainly avoided, unless an adventitious membrane be formed, in consequence of inflammation. Having accomplished this important part of the operation, the needle is to be withdrawn, when the operator should proceed to extract the opake body.

The patient should now be laid down on a table on his back, with the head somewhat raised, which is a far preferable position to his sitting in a chair, whereas the latter position is the best for executing the primary part of the operation, namely, the bringing the opake lens into the anterior chamber. The operator then makes an opening in the temporal margin of the cornea, with a lancet or double edged extracting knife. This opening is enlarged both upwards and downwards, with a small curved knife, in shape and size similar to the probe-pointed knife described by Baron Wenzel, with

the button removed until it is made sufficiently large to admit of the free passage of the lens; through which a small hook is introduced, with its flat surface between the anterior part of the iris and the posterior part of the lens, which should be carried to the centre of the pupil; the curved point is then turned forwards, and the cataract laid firm hold of, when it is extracted without any difficulty. By this means, the cataract is extracted without any pressure being made upon the ball, and through an opening much smaller than what is required in the usual operation of extraction. Should the cataract separate while in the act of extraction, which is sometimes the case if it be brittle, the fragments may be extracted separately, either with the hook or a small scoop. Where, however, the fragments are small, they may be suffered to remain, as they are sure to sink to the bottom of the anterior chamber, where they usually dissolve before the opening in the cornea has healed sufficiently to admit of the eye being used; and as the opening is made vertically, at

the outer margin of the cornea, they do not interfere with its healing, as would be the case were the section of the cornea made in the usual manner.

This operation is of course only to be performed when the lens is of too firm a consistence to be broken down and passed into the anterior chamber for absorption, which latter is the favourite method of Sir William Adams, to be hereafter described.

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#### SAUNDERS' OPERATION FOR CONGENITAL CATARACT.

This is also called *Keratonyxis* by the French and German oculists.—We first prepare for the operation by the use of the extract of belladonna, stramonium or hyosciamus diluted with water to a moderate consistence, and dropped into the eye. In half an hour or an hour the pupil is fully dilated, and the application should be washed off. The patient is confined in a proper position, and in a situation near the window by a sufficient number of assistants, who

take great care to fix the head motionless, and to secure the limbs from moving. The operator, seated on a high chair behind the patient, takes the speculum in one hand and the needle in the other. He next secures the eye by making gentle pressure with a concave speculum introduced under the upper eyelid with his left hand, an assistant at the same time depressing the lower. He then penetrates the cornea as near to its junction with the sclerotica as it will admit the flat surface of the needle to pass, in a direction parallel and close to the iris, without injuring the membrane. When the point of the needle has arrived at the centre of the dilated pupil, he proceeds with a gentle lateral motion working with the point and shoulders of the needle only on the surface and centre of the capsule, in a circumference which does not exceed the natural size of the pupil. This object is *permanently* to destroy the central position of the capsule; merely to pierce it would not answer the intention, because the adhesive process will readily close the wound.



Having acted upon the centre of the anterior lamella of the capsule to the desired extent, he gently sinks the needle into the body of the lens and moderately opens its texture. In doing this the edge of the needle may be inclined, by which motion the aqueous humour will escape, and the lens will approach his instrument; but at the same time the field for operating will be diminished by the contraction of the pupil. The needle and speculum are now to be withdrawn, the eye is to be lightly covered and the patient put to bed.\*

In some cases Mr. Saunders punctured the sclerotica and perforated the capsule from behind, and this is the method more usually followed at present. It gives the surgeon more power and prevents the escape of the aqueous humour, and consequent capsular adhesion to the iris, while the process of absorption is also accelerated.

\* Dorsey's Surgery, Vol. I, page 340.

## SIR WILLIAM ADAMS'S OPERATION.

Sir William Adams at first followed the practice of Mr. Saunders, but has subsequently objected to it, on the ground that by leaving the opaque lens to be absorbed *in situ*, after lacerating the capsule, and loosening its texture with the needle, an uneven pressure is made by the broken fragments of that body against the posterior surface of the iris, frequently giving rise to severe and dangerous inflammation, besides which, solution and absorption of them are by no means effected so rapidly, as when they are placed in the anterior chamber.

Sir William Adams thinks his improved operation for "solid cataract in children and adults" perhaps more extensively applicable, and one which has proved more generally successful, than any other, either ancient or modern. It is thus performed:

"Having secured the eye by making a gentle pressure with the concave speculum, introduced under the upper eyelid, I pass the two edged needle through the sclerotic coat, about a line

behind the iris, with the flat surface parallel to that membrane, it is then carried cautiously through the posterior chamber, without in the slightest degree interfering with the cataract or its capsule. When the point has reached the temporal margin of the pupil, I direct it into the anterior chamber, and carry it on as far as the nasal margin of the pupil, in a line with the transverse diameter of the crystalline lens. I then turn the edge backwards and with one stroke of the instrument, cut in halves both the capsule and cataract. By repeated cuts in different directions, the opaque lens and its capsule are divided in many pieces, and at the same time I take particular care to detach as much of the capsule as possible from its ciliary connexion. As soon as this is accomplished, I turn the instrument in the same direction as when it entered the eye, and, with its flat surface, bring forward into the anterior chamber, as many of the fragments as I am able: by these means, the upper part of the pupil is frequently left perfectly free from opacity. By cutting in

pieces the capsule and lens at the same time, not only is capsular cataract generally prevented, but the capsule is also much more easily divided into minute portions than when its contents have been previously removed.

The needle which I employ in this operation, is eight-tenths of an inch long, the thirtieth part of an inch broad, and has a slight degree of convexity through its whole blade, in order to give it sufficient strength, to penetrate the coats of the eye, without bending. It is spear-pointed, with both edges made as sharp as possible to the extent of four tenths of an inch. Above the cutting part it gradually thickens, so as to prevent the escape of the vitreous humour.\* *Adams on Cataract, pp. 255-6.*

\* Doctor Gibson has invented and used with success, a scissar so delicate as hardly to exceed in size the iris knife of Sir William Adams. Its edge is so constructed as to operate like a knife, and of course it perforates the coat of the eye with great facility. Its peculiar advantages are, that when introduced, the blades may be opened, and the lens being kept *in situ*, by one edge

## ARTIFICIAL PUPIL.

## SIR WILLIAM ADAMS'S OPERATION.

“ For the purpose of dividing the iris, I introduce the point of the instrument, through the coats of the eye, about a line behind that membrane. The point is next brought forward through the iris, somewhat more than a line from its temporal ciliary attachment, and cautiously carried through the anterior chamber, until it nearly reaches the inner edge of that membrane, when it should be drawn nearly out of the eye, making gentle pressure with the curved part of the cutting edge of the instrument, against the iris, in a line with its transverse diameter. If, in the first attempt, the division of the fibres of the iris is not sufficiently extensive, the point of the knife is to be again carried forward, and similarly withdrawn, until the before and the other behind, it is cut to pieces without injury to the iris or vitreous humour, while its remains can be afterwards forced, by the shut blades, into the anterior chamber for dissolution. See the Philadelphia Medical and Physical Journal, No. 5.

incision is of a proper length. I take care, however, very freely at the same time to cut the cataract in pieces. Some of these pieces I bring into the anterior chamber, and leave the remaining portions in the newly formed openings of the iris. These act as a plug in preventing its reunion by the first intention, and assist the radiated fibres, in keeping the pupil more extensively open; by the time these fragments are dissolved, the iris has lost all disposition, or indeed power, of again contracting; its divided edges having by that time become callous, and being drawn considerably apart by the permanent contraction of the radiated fibres."

"In order to prevent the escape of the aqueous and vitreous humour, more especially in the very fluid state of the latter, I carry the instrument, with the edge turned backward, through the sclerotica and iris, as when the aperture through these coats is made by turning the instrument in the way described by Cheselden, (in a different position to that in which it entered) it is thereby so much stretched open, that

the vitreous humour escapes in great abundance, rendering the coats of the eye so flaccid, that it is almost impossible afterwards to divide the iris, there being then no sufficient counter-resistance afforded to the action of the instrument to accomplish this object. Instead, also, of withdrawing the instrument out of the eye at once, as recommended by him, I repeatedly carry it forwards, and then withdraw it in the same line with the iris, making as gentle pressure as if I were dividing fibre after fibre, until the opening is full two thirds the extent of the diameter of that membrane; by this means there is no hazard of its reclosure, and little fear of the iris becoming detached from the ciliary ligament, which were, I conceive, the two principal sources of failure, when the process recommended by Cheselden was pursued."

Adams employs, for this operation, "a small curved-edged iris scalpel; the cutting part of which is similar in form to that of a dissecting scalpel, and evidently much better adapted to divide the iris with facility than the spear point-



ed knife of Cheselden; until my present instrument was constructed, I repeatedly failed with the other, to accomplish the object intended.”\*

The operation, as performed by Dr. Physick for artificial pupil, unites simplicity with facility; and is applicable also to cases of opacity of the cornea, where it is desirable to make an opening through the iris, opposite the lucid part of the cornea.

The operator makes a section of the cornea, as for the extraction of cataract, and afterwards removes a portion of the iris, by means of a pair of forceps terminating in narrow extremities, upon one of which is fixed a sharp circular punch. The iris, in cases where the pupil is obliterated, must be punctured by the point of the knife, in making the section of the cornea, and then the forceps can readily seize it.

To prevent the obliteration of the pupil, where the iris is inflamed, the use of belladonna or stramonium has been recommended. A

\* Op. citat. p. 269-70-74-75.

great dilatation of the pupil is by this means produced.

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### ECTROPION, OR EVERTED EYELID.

The operation for the relief of this disease, “consists in cutting out a portion of the lower eyelid, resembling the letter V. The piece thus removed, is one third of an inch wide at its upper part, the sides of the wound are approximated by a stitch, and the diseased conjunctiva cut off. This effects invariably a complete and speedy cure.”

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### ENTROPION OR TRICHIASIS.

The eyelid, in this disease is inverted upon the eye, and keeps up a constant and violent inflammation. In the simpler kind of Trichiasis, which is owing to the growth or relaxation of the outward skin and cellular membrane of the eyelid, the operation consists in simply cutting out with the scissars a ply or double of the skin of the eyelid of an oval form, which is held

between the finger and thumb, care being taken to avoid seizing the orbicularis muscle.

But if this inversion be a consequence of ulcers and contraction of the inner and cartilaginous edge of the eyelid, forming a kind of stricture which prevents the inner edge from rising fully over the eyeball, and which drags in, and inverts the margin of the eyelid, then a different operation becomes necessary. The following is that recommended and successfully performed by Dr. Dorsey. "A hook is passed through the edge of the eyelid in order to gain a secure hold of it, and with a pair of sharp scissars the necessary portion of the eyelid is removed by two or three cuts. The punctum lacrymale must be carefully avoided."

The portion to be removed comprises all that from which the cilia proceeded.

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### EXTIRPATION OF SCHIRROUS TONSILS.

Lisfranc has recommended the extirpation of schirrous tonsils by excision. The diseased gland is to be seized with a hook, and dissect-

ed out with a blunt pointed bistoury. But the difficulty of applying a cutting instrument, and the risk of wounding important parts, (the distance between the tonsils and the carotid artery being only half to three quarters of an inch in fleshy persons, and one third of an inch in thinner ones) renders this operation troublesome and hazardous.

A much safer method is that by ligature, the manner of applying which we borrow from Dr. Physick, whose success is the best guaranty for the propriety of the means he employs.

The instrument which he describes and constantly uses is a double canula about four inches long, with short arms soldered on the sides, near one end of the instrument at right angles to it. Through the tubes is passed a doubled iron wire, one end of which is fastened round one of the arms of the instrument having the other free and projecting five or six inches; by which the size of the noose may be increased or diminished at pleasure. The selection of

a proper piece of wire is of much importance. It should be tough and flexible, formed of soft pure iron, having firmness enough to allow of its being pushed backwards and forwards in the canula, without bending too easily, so that the noose may be enlarged or diminished. The wire Dr. Physick uses is about one twenty-fourth part of an inch in diameter, or perhaps rather less. A pair of flat pliers should also be provided to take hold of and move the wire conveniently. Dr. P. after enumerating the evils attending the usual method of applying the canula, and indicated in nearly the above words the kind of instrument he uses, proceeds to detail the different steps of the operation as follow.

“ —The noose formed by the doubling of the wire projecting beyond the end of the instrument, is to be made large enough to pass easily over the enlarged tonsil, and should be bent a little to one side, in order that it may more easily be pushed down upon the base of the tumour.

“ The patient is to be seated opposite a win-

dow, and his tongue must be held down by an assistant with the handle of a large spoon or with a spatula. The surgeon is then to slip the noose over the tonsil, and down to its base, taking care not to include the uvula, which, when the swelling is large, is apt to be in the way. The wire is then to be drawn sufficiently to fix it loosely on the part, and the surgeon is to satisfy himself, by an attentive inspection, that it is properly applied. This being accomplished, the wire is to be taken hold of with the pliers, and drawn through one side of the canula, so as to secure it at once, on the base of the tonsil as firmly as possible, and then to fasten it on the arm of the instrument, and thereby prevent all entrance of fresh blood into the tumour. This method of stopping the circulation of blood in the swelling, necessarily occasions severe pain at the moment, but the severity of it soon ceases.

“ On examining the tonsil after a few minutes, its colour will be observed to be changed to a deep purple or almost black, and its surface

smooth and polished, owing to the exterior membrane being stretched.

“ It has hitherto been my custom to allow the instrument to remain thus applied for twenty-four hours, with the view of destroying completely the life of the enlarged gland. I am, however, of opinion, that a much shorter time would be sufficient, as eight or twelve hours, which I propose soon to ascertain. After having destroyed the life of the swelling by the above means, the next step of the operation is the removal of the instrument, which is very easily accomplished in the following manner. Take a firm hold of the end of the canula projecting from the mouth, then disengage the wire on one side from the arm of the instrument; straighten it, and with the pliers push a small portion of it back through the canula, and repeat this until the noose is so much enlarged as to slip off the tonsil.

The operation is now completed; the tumour appears shrivelled and of a dull white colour; the patient suffers no pain; the inflammation is



moderate, and, after a few days, the dead parts are separated and thrown off, either entire or in fragments, which are sometimes spit out, sometimes swallowed. Until the separation is completed, the breath is somewhat offensive. I have never had any trouble with the small ulcer remaining after the separation of the tumour. It has healed so rapidly as generally to escape notice."

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### EXTIRPATION OF HÆMORRHOIDAL TUMOURS.

Whatever difference of opinion may have formerly existed among surgeons, respecting the comparative merits of removing hæmorrhoidal tumours by ligature or by excision, the weight of authority and experience is now decidedly in favour of the first mentioned method, whether we regard safety or success. Mr. Abernethy does indeed still incline to the use of the knife, and there are cases, as where the tumours are completely external, which may justify this practice. But, remembering that the upper

hæmorrhoidal veins empty into the lower mesenteric, and consequently, that from the former to the liver there is no valve. we can never, under the use of the knife or the scissars, be secure from alarming and fatal hæmorrhages, instances of which are recorded by Petit and others, especially from cutting some internal hæmorrhoids. "The operation is moreover incomplete unless the whole diseased parts are taken away and the extremity of the gut consolidated by inflammation. This intention is best fulfilled by the use of the ligature." Such is the language of Mr Charles Bell; but we must leave him, when we would describe the best kind of ligature and the simplest and happiest method of applying it. On this point we again take the liberty of borrowing the directions of Dr. Physick as given in the same communication,\* from which we extracted for the steps of the last operation.

\* The Philadelphia Medical and Physical Journal, No. I. Art. 2.

The length of the canula should not exceed two inches—we have seen it not longer than one inch. The wire, the same as that already spoken of, is to be drawn at once tight round the base of the tumour, by means of this instrument, and “at the end of twenty-four hours, and probably sooner, the wire may be removed, in the manner above explained. The tumour will be found shrivelled and black, and in a few days will be separated and thrown off, under the application of a soft poultice of bread and milk.”

The degree of pain experienced by different patients, varies very much, without any assignable cause; “some patients making no complaint whatever, even though two or three tumours are operated on at the same time, while others exclaim violently from its intensity.”

“As soon as the wire is removed, the patient is relieved from almost all uneasy sensations, and the ulcer heals very readily, as after the extirpation of the tonsil. No one can properly appreciate the advantages resulting from the

above method of removing hæmorrhoidal tumours, who has not seen them treated by allowing the ligature to remain during the separation of the part. Under that mode of operating, the patient is never at ease during the whole time; the discharge of the fæces is often excruciating; even moving in bed is dreaded; and in the last case in which I performed the operation in that manner, the convulsive twitchings of the lower extremities which were induced, became so frequent and so violent, that I was uneasy, through an apprehension of tetanus being the consequence. It seems to me probable that one reason of the difference between the effect of a wire and a common ligature may be, that however firmly the waxed ligature may be drawn round, and tied on the base of the tumour, before a second knot can be tied to secure the first, the elasticity of the parts compressed opens the first a little, and of course the exclusion of blood and nervous influence is not so complete as when the wire is used. which can be fastened on the arm of the instrument, at the time

when it is drawn round the swelling, as tight as possible. The pinch given by the wire is soon destructive, and any degree of restoration is rendered impossible.

It might be supposed, if a thread were used, it could be cut off after a short time; but the swelling comes on so speedily, the parts retract so much within the anus, and are so extremely tender to the touch, that it is difficult to find the noose: when found, the operation of dividing it, either with knife or scissars, is productive of so much pain, that I have known some patients refuse to submit to it. The removal of the wire occasions no pain.

It may be proper to mention that when the tumour happens to be attached to the inside of the anus anteriorly, some difficulty of voiding urine is often complained of; but this symptom always, in my patients, has subsided immediately after the removal of the wire."

## REMOVAL OF POLYPI.

## POLYPUS IN THE NASAL SURFACES.

For the removal of this tumour the forceps is generally preferred. The index finger of the left hand is introduced into the posterior nasal fossæ to protrude the polypus forwards, if it be large, and with the right hand and the forceps applied as near the root as possible, it is seized and extracted.

Where it adheres so obstinately as not to permit removal by traction, a ligature is to be applied, by means of the double canula, which is introduced along the floor of the nostril, until the wire appears in the throat behind the velum palati. It is then seized with the forceps or a blunt hook, and by means of the fore and middle fingers of the right hand is pushed beyond the pendulous tumour and hooked up behind it, so that the wire be applied round the root. The ends of the wire are now, supposing the canula to have been withdrawn, to be put into the tubes, and the instrument carried along until it pushes against the forepart of the root of the

tumour, and has drawn the noose or ligature tight around the root. It is then fixed by twisting it about the wings of the nearer end.

On the second and every succeeding day the noose is to be drawn tighter, until the root of the tumour being cut through the instrument comes away. We are told to watch when the polypus becomes loose, as it has occasionally separated in the night time and endangered suffocation by falling over the glottis.

The following case is worthy of every attention. "A gentleman having suffered many unsuccessful attempts for the removal of his polypus, came to Philadelphia and consulted Dr. Physick: he found a large tumour projecting behind the soft palate, as low as the extremity of the uvula, and filling completely the posterior nares and cavity of the nose. After vain attempts to extract it in the usual manner with ligature and forceps, a piece of tape was made stiff by passing silver wire through it, and this was fixed on the projecting part of the tumour by a firm knot: the tape was now pulled forci-



bly and with it came away the polypus, which was of prodigious size."

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### POLYPUS OF THE UTERUS.

The best and perhaps we might add the only instrument for removal of uterine polypus is the double canula, the tubes of which are made to separate and unite at pleasure, by means of a connecting base or third piece which can be adapted to them like a sheath. The ligature is to be passed through the tubes, which are to be placed close together, and no loop is to be left at the middle. They are then to be carried up along the tumour, generally betwixt it and the pubis. Being slid up along the finger to the neck of the polypus, one of them is firmly retained in its situation by an assistant, and the other carried completely round the tumour, and brought again to meet its fellow. The two tubes are then to be united by means of the common base. The ligature is thus made to encircle the polypus, and, if necessary, it may afterwards be raised higher up with the finger alone, or

with the assistance of a forked probe. If the first tightening of the ligature, by way of trial, give no pain, it is to be drawn firmly, so as to compress the neck of the tumour sufficiently to stop the circulation. It is then to be secured at the extremity of the canula; and as the part will become less in some time, or may not have been very tightly acted on at first, the ligature is to be daily drawn tighter, and in a few days will make its way through. After the polypus is tied, it is felt to be more turgid and harder; and if visible, it is found of a livid colour, and presently exhales a fetid smell. These are favourable signs.

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### STRICTURE OF THE URETHRA.

Of the different kinds of strictures, those of the urethra most frequently engage the attention of the surgeon. The three methods practised for their relief are; 1st, Introduction of the bougie or catheter alone; 2nd, Introduction of the bougie, armed with caustic; 3rd, Section of the stricture by a cutting instrument.

As the two first come rather under the head of the manipulations of surgery than operations, strictly so called, we shall only notice the last.

The division of a stricture, by means of a cutting instrument, was first performed by Dr. Physick in 1795, and in several instances since that time, he has repeated the operation with success. The instrument employed for the purpose is a lancet, concealed in a canula: when the stricture is seated anteriorly to the bulb of the urethra, no danger or difficulty attends the division of it by means of this instrument; but if the stricture be situated at the bulb, a very accurate knowledge of the anatomy of the parts will be necessary, and great caution in the operation. A small wound, however, of the urethra, made with a sharp lancet, would occasion no great trouble, and would probably heal very readily. The urethra is generally distended behind the stricture, and of course it is not easy to pass the knife in a wrong direction. After the stricture is cut through, a flexible catheter should be introduced and kept in

the bladder three or four weeks; after it is removed, a bougie should be frequently introduced."

The success of this operation, and the extension of a nearly similar method for relieving strictures of the rectum, are the best answers to the heedless censures of Mr. John Bell, on introducing a cutting instrument into the urethra.

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### STRICTURE OF THE RECTUM.

Mr. Brodie has successfully operated for this disease, by the cautious introduction of a straight blunt-pointed bistoury, and slowly dividing the strictured portion of the gut.

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### HYDROCELE.

Various operations have been proposed and practised at different times for the radical cure of hydrocele, viz. Incision, Excision, Caustic, Seton, Injection.

The first, or that by incision, consists in making a longitudinal incision, the length of the

tumour, and filling up the cavity with lint, or lint dipped in oil, or covered with cerate. This method was recommended by Celsus, and is, we are told by Professor Giuntini, in his course of operative Surgery, the favourite one of the surgeons of Florence.

The operation by excision is executed by exposing the tunica vaginalis testis and cutting off as much of it as possible so as to produce an entire obliteration of the cavity. This was also proposed by Celsus. It has been practised by some modern surgeons and was resorted to by Dupuytren in the case of a young man, with a large hydrocele, in the Hotel Dieu, in the month of July 1819. He died on the eighteenth day after the operation from mortification of the testicle and scrotum and extensive inflammation of the chord, accompanied by tenderness of the abdomen and inflation of the intestines.

The operation by the caustic and seton may be placed on the same footing as that by excision and forbidden as hazardous and cruel.

The practice of Injection first recommended

by Earle is now most generally adopted, and is thus performed. After having the patient seated on an elevated chair, the tumour is grasped in the left hand of the operator so as to make it tense, and the trochar is passed into the distended sac, in a direction rather obliquely upwards than directly forwards, care having been taken to ascertain the situation of the testicle posteriorly. Before the trochar is withdrawn, it is necessary to ascertain the complete introduction of the canula, which is to be held steadily in, by slightly pinching up the scrotum against its sides, until the sac is entirely emptied, so as to prevent the effusion of the fluid into the cellular membrane of the scrotum.

If a lancet be preferred to the trochar, for making the opening, the introduction of the canula should be prompt to guard against the effects just stated.

A syringe, the pipe of which fits the canula, is then to be applied, and a portion of whatever fluid may be preferred on the occasion is to be injected into the sac so as to distend it to

its former dimensions. Or a bag of gum elastic with a pipe and stop cock may be adapted to the canula, and when its contents are emptied into the cavity of the sac, it may be unscrewed from the pipe and the fluid suffered to remain in the requisite time, which varies from five to ten minutes: it is then let flow out and the canula withdrawn.

The most critical part of the whole operation is the injecting the sac, for unless the canula be well in the cavity, and kept there, the contents of the syringe will be forced into the cellular membrane of the scrotum, and give rise to extensive sloughing, endangering the testicle and even the life of the patient. This accident has actually occurred in the hospital of the Charité at Paris, with the two present celebrated surgeons of that establishment.

The method of cure proposed by Mr. Hunter is very similar to that by incision. It consists in making an incision an inch in length at the anterior part of the scrotum; and, after the water is evacuated to introduce a quantity of



dough into the cavity, an assistant keeping the aperture sufficiently wide by two hooks—Inflammation followed by granulations takes place; and the cavity is gradually filled up.

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## HERNIA.

The three most common kinds of hernia are, 1st, Inguinal, or Scrotal, called *Bubonecele*; 2nd, Femoral, or Crural, called *Meroccele*; 3d, Umbilical, called *Exomphalos*. The minor subdivisions are named according to the part protruded, as *Enteroccele* or intestinal hernia; *Epiploccele* or omental hernia, &c.

The difficulties of the operations for strangulated hernia have been much exaggerated, and real obstacles created by too nice and often subtle division of membranes and fasciæ covering the protruded intestine.\* Two or three

\* The dangerous consequences of strangulation must not be confounded with the difficulties of the operation. The former are always great. Out of six persons operated on for hernia, by M. Dupuytren, (who ranks among the very first surgeons in Europe) in the space of ten days, four died.

dissections of hernia, and having been a witness to an operation for this disorder, will do more to instruct the student, than the longest lessons and most minute explanations. But we are not to be understood as undervaluing the advantages, or denying the necessity, of correct anatomical knowledge of the parts concerned in hernia; the position and relative situation of which ought to be familiar to every surgeon. In lieu of the practical advantages just stated, the plates of Cooper and Scarpa may be consulted.

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#### SCROTAL OR INGUINAL HERNIA.

An attentive examination of the patient, and study of the symptoms, presenting sufficient motives for the operation, it is conducted as follows:

The patient is placed on a table, with his legs hanging over its end, his shoulders and knees being a little raised by pillows, in order to relax the abdominal muscles; though some surgeons prefer operating on the patient in his bed. The pubes are next shaved; and we are

directed in those cases, where no symptoms of gangrene are present, and there is no stricture at the neck of the sac, to limit the operation to making an incision with the scalpel through the skin and cellular membrane, beginning an inch from the abdominal ring, in the direction of the fibres of the external oblique muscle, and extending nearly to the bottom of the tumour, so as to expose the abdominal ring and the portion of the tendon forming it. A small hole is to be scratched with the point of a scalpel or bistoury, through the tendon, half an inch above the ring, in a direction upwards and outwards, towards the spine of the ilium: a director should now be passed through the hole under the tendon and out at the ring, on the groove of which a bistoury is carried along, so as to divide the tendon. This operation was first performed by Petit, and has been practised by many surgeons since his time. Dr. Physick, among others, recommends it, urging, with great propriety, in its favour the fact, that the surgeon, could he have accomplished the return of the intestine

by the taxis, anterior to his dividing the tendon, would have rested satisfied, without thinking of opening the hernial sac.

Others with much plausibility and apparent caution prefer, in all cases, opening the sac and seeing the condition of the strangulated intestine. The operation is thus conducted. The patient being properly placed and the pubes shaved, the surgeon takes hold of the tumour with his left hand, and makes with a scalpel a first incision through the common integuments only, beginning about an inch and a half above the base of the tumour and reaching very near the bottom of the scrotum. The different aponeuroses or layers covering the hernial sac are then in succession to be slightly scratched, and divided by pushing a grooved director under them, and carrying in its groove a bistoury upwards and downwards, in the direction and to the extent of the first incisions. In no instance, after the first incision through the skin and loose cellular membrane, is the scalpel or bistoury to be used with its edge downwards or on the tu-

mour; but always upwards, cutting out on the director. In this as in all other operations, safety is more to be studied than despatch. Sometimes one or more small arteries are cut in the first stage of the operation, which if they bleed freely may be tied. The sac being now exposed, it is to be pinched up with the fingers or forceps, and a small opening made in it with the edge of the instrument directed horizontally; a director is then introduced into the cavity, and the opening enlarged by running a blunt pointed bistoury on it both upwards and downwards. The finger next carried up to the neck of the sac enables the surgeon to ascertain the degree and extent of the stricture, and to choose whether he will merely cut the strictured tendon, or the neck of the peritoneal sac, or both. Sir Astley Cooper recommends dividing the stricture by passing the knife (bistoury) between the ring and the sac: assigning as a reason, that by thus leaving a larger portion of the peritoneum uncut, the cavity of the abdomen is more easily closed. But the common practice, at least on

the Continent, is to carry up the blunt pointed bistoury till it meet the stricture, when the blade of the instrument, hitherto lying flat on the finger, is gently turned with its edge forwards, and the stricture cut by a slight raising of the instrument in a *direction directly upwards*, neither inclining to the ilium nor the pubis. Where the neck of the sac will not admit the end of the finger, a director is to be passed into it, and the probe pointed bistoury moved cautiously along it, till it meets the stricture, and the mouth of the sac and the ring are to be cut in the direction and with the precautions already given.

A frequent situation, however, of the stricture, according to Sir A. Cooper, is higher up in the mouth of the sac, where it opens into the abdomen, that is, an inch and a half to two inches above and to the outer side of the ring: it is there produced by the pressure of the tendon of the transversalis muscle of the abdomen, which passes over it, and by the resistance of the border of fascia which passes under it. The following is in such a case the manner of ope-

rating. "The surgeon passes his finger up the sac and through the abdominal ring, until he meets with the stricture; he then introduces the probe pointed bistoury with its flat side towards the finger, but anterior to the sac, and between it and the abdominal ring, his finger being still a director to the knife. Thus he carries the knife along the fore point of the sac until he insinuates it under the stricture formed by the lower edge of the transversalis and oblique muscles, and then turning the edge of the knife forwards, by a gentle motion of its handle, he divides the stricture sufficiently to allow the finger to slip into the abdomen: the knife is then to be withdrawn with its flat side towards the finger, as it was introduced to prevent any unnecessary injury of the parts. The direction in which this orifice is divided is straight upwards, opposite the middle of the mouth of the sac, as in this way the epigastric artery can scarcely be cut, whatever be its relative situation with respect to the sac."

It has been remarked by some experienced



surgeons, particularly Mr. Charles Bell, that this is a difficult operation, owing to the firm pressure of the transversalis muscle, and when accomplished it is of doubtful efficacy, as it is probable that in all cases above a few days standing, the sac is more or less condensed, and that when inflammation or compression has lasted for any considerable time, although the stricture may have been originally on the outside of it, it is no longer entirely so. In case the incision then of the neck of the herniary sac be required, it is to be made, as in all the others, directly upwards.

If the intestine and sac be connected by adhesions, the greatest caution and delicacy are required in opening the sac, and subsequently in separating the intestines either from the sides or neck of the sac. If the adhesions are new, they may be separated by the fingers; if confirmed, the sac should be dilated to its mouth, and the tendon of the internal oblique should be slit up to the part at which the hernia descends from the abdomen.

## EPIPLOCELE.

Where the hernia is entirely or part omental, it may be returned, if after the operation the omentum be in a healthy state; but if gangrened and dead, or very bulky, a part of it should be removed as follows. "The surgeon raising the omentum, whilst an assistant grasps it higher up to prevent its return into the abdomen, cuts it off near the mouth of the sac. Some small arteries always bleed, which are to be tied by a fine ligature; and when the hæmorrhage is stopped, the omentum is to be returned into the abdomen, with its divided surface applied to the mouth of the sac, from which the ligatures are suspended, and it thus forms a plug that shuts up its cavity." The practice of tying the end of the omentum is now generally abandoned, for, as has been correctly observed, it "is but substituting a ligature for the stricture of the omentum; so that restlessness, anxiety and fever; pain of the belly, nausea and vomiting; in short, peritoneal inflammation and death may follow this."

The treatment of the wound after the reduction of hernia consists in bringing together the *integuments*, (*but not the sac*) by one or two stitches, which may be supported by adhesive strips. Above this a soft compress of lint and of old linen is placed, and the whole secured by a roller passed as a spica bandage. It has been very properly recommended, that when the patient is inclined to cough, or to have his bed clothes changed, he should apply his hand on the dressing.

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#### CRURAL OR FEMORAL HERNIA.

The patient is to be placed on a bed or a table of a common height, with the body lying in a horizontal direction but the shoulders a little elevated; the legs as high as the knees, hanging over the edge of the table; and the thighs a little bent in order to relax the abdominal muscles. The bladder must be emptied and the diseased side shaved. A crucial incision in the form of a T. inverted is then to be practised over the hernial tumour, by draw-

ing up a portion of the skin laterally between the fingers, and cutting this obliquely from above inwards, an inch and a half above the crural arch in a line with the middle of the tumour, and downward to the centre of the tumour below the arch. A second incision nearly at right angles with the other is next made, beginning from the middle of the inner side of the tumour and extending it across to the outer side. The external pudendal artery is sometimes divided in the longitudinal incision and it is proper to secure it before proceeding any farther.

Having next disentangled the tumour from the binding of the general fascia of the thigh, we proceed as in the bubonecele by lifting up the laminæ with the fingers and carefully dissecting them one by one, or by introducing the director under each. and cutting on it. Sometimes after the very first incision the sac is laid bare, and at other times, if the hernia be very small, may be involved in the inguinal glands and again covered by cellular membrane in a state of suppuration. The last investing

membrane of the sac, the fascia propria is liable without great attention to be mistaken for the sac itself.

The sac being fully exposed it is to be opened, and the cavity exposed in the same manner and with the same precautions as in the inguinal or scrotal hernia.

A difference of opinion exists as to the direction in which the tendon causing the stricture is to be cut. Sir Astley Cooper directs the bistoury to be carried obliquely upwards and inwards at right angles with the crural arch, and Dupuytren, though formerly in the practice of cutting directly upwards, now makes his incision in the same direction. Mr. Charles Bell says, that the incision must be straight upwards is evident, neither inclining inwards for we will cut the cord, nor outwards where the epigastric artery is before the knife: and Lisfranc cites to his class. a surgeon of Lyons who has operated eight or ten times in femoral hernia with success and in all cut directly upwards. The fact is, that if the edge of the bistoury be

only slowly and steadily pressed against the tendon, till it be cut, without interesting the soft parts, there will be little danger by pursuing either of these methods. In proof of this, we may adduce a case of crural hernia in which "no part of the neck of the sac could be felt free from the pulsation of a very considerable artery. Dr. Physick very promptly divided the stricture by cutting in the usual direction, but taking great care to make a very small incision or rather scratch with the point of the bistoury, through the stricturing tendon."

In the male subject, where the hernia is so large as not to be reduced after the incision of the sheath and posterior edge of the crural arch, and that it is required to divide the anterior edge, the surgeon must proceed by making "an incision through the tendon of the external oblique muscle over the mouth of the hernial sac, about a quarter of an inch above the crural arch, which will expose the spermatic cord. This being drawn by the finger, or by a curved line and removed from the direction of the incision, the surgeon carries his finger into the sac, with

the bistoury upon it, and the anterior edge of the crural arch is cut without the smallest risk to the spermatic cord."

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### EXOMPHALOS, OR UMBILICAL HERNIA.

The method proposed by Dr. Physick, and practised by him and Dr. Wistar, is perhaps preferable to any other. "It consists in making a crucial incision through the integuments of the tumour, and dissecting the four angles thus formed down to the neck of the sac; an opening is next made into the sac, at its upper part, of a sufficient size to afford a view of its contents; should these be sound they are to be reduced, if practicable, without dilating the umbilical aperture; but if this can not be done, that aperture is to be enlarged outside of the sac, taking care not to wound the neck of the sac. When the contents of the sac are reduced, a ligature is to be tied round its neck."

Umbilical hernia in young subjects has been treated by Desault with success, in upwards of fifty cases by a ligature. The process is a simple one: The protruded viscera being returned



into the cavity of the abdomen, the opening is pressed on by the surgeon with one hand, while with the other he raises the sides of the sac, and ascertains that no part remains unreduced. A waxed ligature is then to be passed several times round the basis of the empty sac, and secured at each turn by a double knot, drawn tight enough to occasion an inconsiderable degree of pain. “ The tumour is to be covered with lint, over which compresses are to be applied, secured by a bandage and shoulder straps. In a day after the first ligature is applied, the parts enclosed within it shrink, and it becomes necessary to tie a second ligature considerably tighter. A third ligature, some days after, often becomes necessary. In eight or ten days the tumour falls off, and leaves a small ulcer, which speedily heals. Although the umbilicus is by this time sufficiently firm to resist the protrusion of the viscera, yet prudence dictates the propriety of a bandage and compress for several months.\* The probability of the cure di-

\* Dr. Physick, with his characteristic attention to

minishes with the age of the patient, and in Desault's hands, it failed in a girl aged nine years. The operation should therefore be recommended and performed early."

The use of the ligature is thought unnecessary and even improper by some surgeons, who assert that compression carefully and steadily applied, is sufficient to bring about the gradual obliteration of the hernial orifice in young subjects.

In the disease, as it is met with in adults, omentum is the part most generally protruded, and, in some cases of long standing, is adherent to the sac; and even where this last is absorbed, it is joined by adhesion to the common external fat. All surgeons concur then in directing great caution to be used in exposing the contents of the tumour, by incisions made on it. They, par-  
every circumstance which can possibly impede the cure, after a surgical operation, urges the propriety and necessity of keeping the abdomen as relaxed and of as reduced a size as possible, by restricting the young patient to soft food, principally rye mush, and sugar and water.

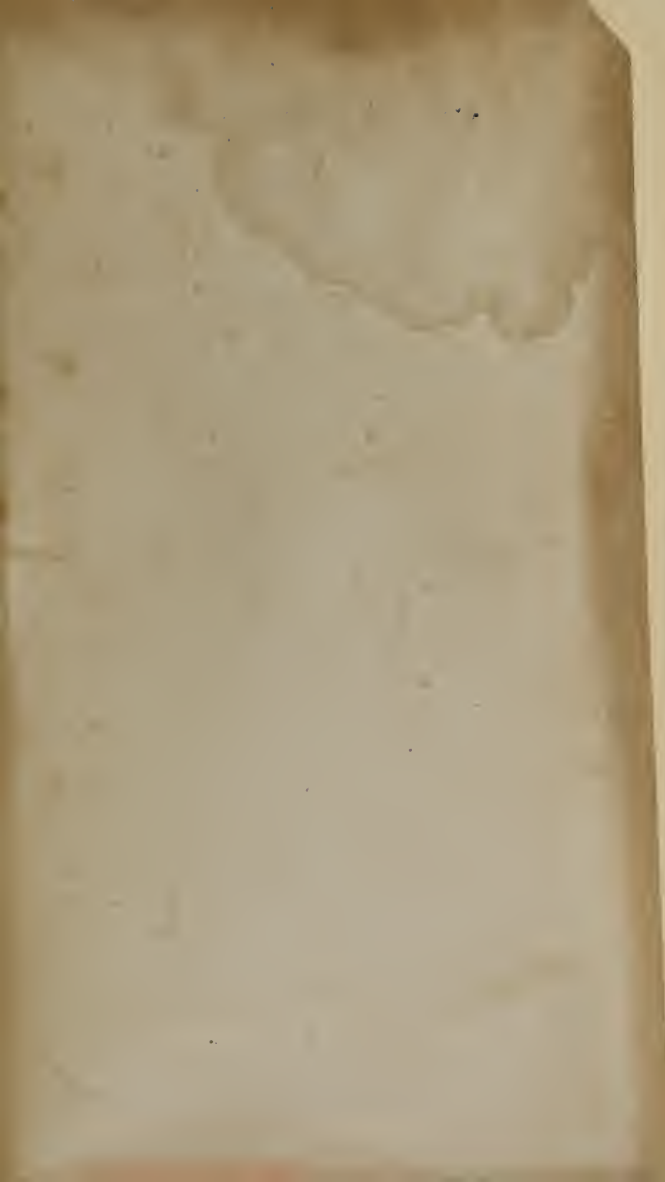
ticularly Scarpa and C. Bell, recommend a semicircular incision on one side of it; and by a cautious dissection of the outer lamina, to endeavour, without opening the sac, to get within the margin of the tendon, which, being cut by the probe-pointed bistoury, the hernia may be reduced, or the last portion of the intestines, which has perhaps fallen into the interstices of the old contents, may be returned. The direction usually recommended for cutting the stricture tendon is upwards. Scarpa advises it downwards in the true umbilical hernia, and transverse or laterally in a line perpendicular to the *linea alba*, when the protrusion is between the parts of that tendon and not through the navel.

If the opening thus made be still too small for the return of the contents of the sac, that part of the latter embraced by the stricture, may also be cut, so as to admit the finger.

## HYDROCELE BIS.

We omitted to notice, under this head, the very neat and mild method of Baron Larrey, for the cure of hydrocele. The first<sup>st</sup> steps of the operation are the same as for injection. Puncturing the sac with a trochar, introduction of the canula, and evacuation of the contents. But in place of a stimulating fluid, a small flat tube of gum elastic, is passed in through the canula, into the sac, and the canula being withdrawn, the tube is left in for twenty-four hours, more or less, according to circumstances, so as to excite inflammation, followed by adhesion, and thereby accomplish a radical cure. If the parts be slow in taking on the inflammatory process, the tube may be gently moved about, so as to irritate the tunica vaginalis.

THE END.







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